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CHARACTER AND PERSONALITY

An International Psychological Quarterly

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EDITORS

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UNIVERSITY OF LONDON

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EXPERIMENTAL STUDIES OF RIGIDITY

I. THE MEASUREMENT OF RIGIDITY IN NORMAL AND FEEBLE-MINDED PERSONS*

J. S. KOUNIN
University of Illinois

Any system of psychology which attempts to deal with problems of personality has to postulate some kind of structure for a person in order to be able to account for certain behavioral events of a non-reflexive character. Whether stated explicitly, or whether implicitly assumed, wherever constructs of a psychoanalytical, neurological, typological, or any other variety have been utilized, all psychological theories have dealt with problems of personality "structure." The following investigation is an attempt to give precise formulation to, and to achieve coordinating and operational definitions for, one of a number of basic concepts utilized in problems of personality structure, namely, the concept of rigidity.

The concept of rigidity has its place in a series of interrelated statements and constructs which are postulated in topological and vector psychology. Briefly, the "person" is said to be structured and differentiated into parts. The unit of structure is coordinated to a geometrical region, or "cell," which occupies a certain position among other regions. The psychological environment in which a person behaves is also structured into regions. Behavior is said to be a resultant of certain forces functioning in and relating to the personal and environmental structures. The structural and positional properties constitute topological psychology. The functional relationships and forces which determine the behavior that occurs within the given structure make up vector psychology.

The construct of rigidity deals with the closeness of the functional relation between cells of the person; in other words, it refers to that property of the functional boundary between the cells of the person which represents the relative independence (degree of segre-

* This article is an abstract of a doctoral dissertation on file at the University of Iowa Library.

gation) of different regions of a person. Occurrences in one region may have quite different effects upon other regions. A change in a region A of a person may produce more change in a region B than the same amount of change in a region X produces a change in a region Y; i.e., tension may spread more easily from region A to region B than from region X to region Y. There may be such differences in rigidity of the boundary between different regions of the same individual and differences in rigidity between comparable regions of different individuals.

The concept of rigidity, particularly as applied to a theory of feeble-mindedness, has been tentatively formulated by Lewin (6). This theory is based upon unpublished studies dealing with the comparative behavior of moron and normal children in experiments concerned with the process of satiation, the resumption of interrupted tasks, and the substitute value of substitute actions. The findings revealed decided differences between the feeble-minded and normal children. After becoming satiated with an assigned drawing activity, the feeble-minded children refused to continue with free drawing, while the normal children did not refuse. The feeble-minded children were said to have been either satiated or "not-satiated," whereas the normal children were "partly satiated." In experiments on resumption of interrupted activities, the feeble-minded children manifested a greater fixation upon goals than did normal children. This was evidenced by their more frequent resumption of interrupted activities. In studies of substitution it was found to be more difficult to create satisfying substitute goals for the original goals in the case of the feeble-minded than in the case of the normal children. The differences between the two groups of individuals were summarized as indicating that the moron children behaved more "rigidly," i.e., in a pedantic, "all-or-none," "either-or" manner. The construct of rigidity was utilized to derive these differences.

It would seem that rigidity of overt behavior cannot be directly coordinated with rigidity of the boundaries of the regions making up a person's structure, i.e., with his dynamic rigidity. Factors other than dynamic rigidity may operate to produce phenomenological rigidity. There are three such uncontrolled factors which may have influenced the results obtained in the experiments cited by Lewin. (1) *The degree of differentiation of the person.* Lewin states, in fact, that "one might consider reconstructing the theory so as to place at the center lack of differentiation rather than ma-

terial properties, or one might dispense altogether with the assumption of a difference in material" (6, p. 228). The mental ages and related degrees of differentiation of the moron and normal children used in the experiments cited by Lewin were not equated. (2) *Degree of differentiation of the relevant areas.* One can speak of the degree of differentiation of the person "as a whole" and of the degree of differentiation of particular areas. Two persons may have the same total degree of differentiation, yet one of them may behave in a more stereotyped manner in a particular situation because the relevant and applicable regions are less differentiated in his case. In the experiments on satiation, after being satiated with drawing "moon faces" the normal children were disposed toward drawing other things in a free drawing situation, while the moron children refused to do free drawings. It is possible that the area of drawing was more differentiated in the normal children and that they could "think of" more to draw. The moron children, on the other hand, may not have had "anything else in mind" and, as a result, were not inclined to continue drawing. (3) *The security of the two groups.* It is not within the scope of this paper to define security within a strict conceptual framework. One might include under this concept such factors in the psychological environment as the fear of failure and the relative barrier quality of unknown regions. If an individual feels insecure, he may exhibit phenomenologically rigid behavior, not because of dynamic rigidity but because he is afraid of attempting the new and so clings to what he does know.

The Problem

The problem of this series of experiments is to evaluate the concept of rigidity, to develop methods of measuring its properties, and to ascertain its validity in theories of age and of feeble-mindedness. More specifically, with factors such as degree of differentiation and "security" controlled, can one speak of rigidity of boundaries of regions? If so, can the concept be related to theories of feeble-mindedness and of age?

A related problem is to ascertain the predictive value of the construct of rigidity and related topological and dynamic concepts. To be specific: Does the theory permit one to state the consequences to be obtained in defined conditions?

The problem of measurement, testability, and predictive-power is one of attempting to ascertain concrete events which may be regarded as symptoms or signs of the postulated causal conditions and

relationships. This implies not merely direct operational definitions of a construct but also the use of the "hypothetico-deductive" method of prediction and verification. A theory is proposed, implications of an "if this is so . . . then" proposition are deduced by relating one construct to another, and these deductions are put to experimental test, i.e., "proof." Such a procedure provides the framework for measurement and for explanation. A combination of the definitions of constructs, and the derivation of behavioral events which can be used as signs of the construct and therefore as means of measurement, and the testing to ascertain whether predictions maintain, is the plan of procedure utilized in the following research.

Definitions, Theory (Postulates), and Derivations (Theorems)[1]

Definition. Rigidity is that property of a functional boundary which prevents communication between neighboring regions. The degree of communication of a region A with a region B refers to the degree of influence of A on B, or vice versa. Regions A and B are in communication to the degree to which a change of the state of A changes the state of B. The degree of rigidity can be regarded as determining: (a) the difference in tension (or other states) which can be maintained by the boundary between neighboring regions and (b) the degree of functional segregation of neighboring regions.

The rigidity of the boundaries of different regions of the same person varies. Nevertheless, it is possible to speak of the rigidity of a Person-1, R(P-1), as compared to the rigidity of a Person-2, R(P-2), when: (1) we compare equivalent regions (a) of the individuals, i.e., regions which correspond to activities of the same psychological meaning, and (2) we further assume that the rigidity of the boundary of region A is representative of the rigidity of the boundaries of other regions (B, C, D . . . X) of the person.

The General Theory. The general theory postulates that rigidity is a positive monotonous function of chronological age. A corollary of this theory is that rigidity is a positive monotonous function of the degree of feeble-mindedness. The latter theory follows if one assumes that mental age corresponds to the degree of differentiation of a person, since the degree of feeble-mindedness is defined as the ratio between mental age and chronological age (IQ.).

[1] Definitions of related concepts can be found in Lewin (**7, 8**) and in Barker, Dembo, Lewin (**1**).

Derivations. The complete logical steps involved in the following derivations are not presented here for the sake of brevity. It is hoped that the brief descriptions of the experiments will indicate how these derivations were obtained. To restate the derivations in their entirety would require more complete definitions of all the terms used.[2] The derivations are as follows: the older and/or more feeble-minded an individual:

1. The less effect a change of state in one region will have upon the state of neighboring regions.
2. The less likely he is to be in an overlapping situation.
3. The more difficulty he will have in the performance of a task which requires him to be influenced by more than one region.
4. The more likely is he to structure a new field which is perceptually ambiguous into a relatively large number of separate, independent regions (achieve a less integrated structure).
5. The less easily can he perform a task which requires that he restructure a given field.

The Experiments

Subjects. Three groups of subjects of equal Binet mental ages were utilized. The following tabulation presents a summarized description of the subjects.[2]

	Old Feeble-minded Subjects (OF)	*Young Feeble-minded Subjects (YF)*	*Normal Subjects (N)*
Number	21	21	21
Mean mental age	80 months	82 months	82 months
Range	69 to 94	72 to 96	72 to 92
Mean chronological age	41.7 years	14.5 years	6.8 years
Range	29 years, 3 months to 53 years, 9 months	10 years, 10 months to 17 years	6 years, 0 months to 7 years, 9 months
Mean IQ*	42	48	99.76
Range	38 to 52	38 to 63	88 to 109

* For those subjects whose chronological ages were above sixteen years, a chronological age of sixteen years was used in computing their IQ's.

The feeble-minded subjects were all inmates of the Iowa State Hospital for Feeble-minded Children at Glenwood, Iowa. All the subjects were diagnosed as functional cases by resident physicians. The normal subjects were all enrolled in one of the elementary public schools of Iowa City.

[2] A more detailed and formal treatment is available in the dissertation at the University of Iowa Library.

Experiment I. Satiation and Co-satiation

Derivation-1. This experiment was designed to test Derivation-1. The general plan was to create experimentally a differentiation of an equal number of regions of security for all subjects, to produce a change in one of the regions, and to ascertain the effect this change had upon the state of the neighboring regions, i.e., to determine the degree of communication between these regions.

As an example indicating how the derivations in this study were arrived at, Derivation-1 is stated below:

1a. The older the individual, the less effect a change of state in one region will have upon the state of neighboring regions.

1b. The more feeble-minded the individual of a given mental age, the less effect a change of state in one region will have upon the state of neighboring regions.

If we let DC equal the degree of communication between the two neighboring regions, CA equal chronological age, and FM equal the degree of feeble-mindedness, then:

(1a) $DC = F\ (1/CA)$ (1b) $DC = F\ (1/FM)$

1. Let us suppose, as represented in Figure 1, that an old feeble-minded individual and a young normal individual are both equally differentiated in equivalent areas, and that a change of state is effected in one of the regions. (OF = old feeble-minded; YN = young normal).

2. According to postulates 1a and 1b, an old feeble-minded individual is to be characterized by a greater degree of rigidity than a young normal individual.

3. It follows from 2 and the definition of rigidity that regions a and b (and other regions) of an old feeble-minded individual will be in less communication with each other than will be regions a and b of a young normal individual.

4. Therefore, it follows from 3 that the older and/or more feeble-minded the individual, the less effect an occurrence in one region will have upon the state of neighboring regions.

Each subject was presented with four drawing activities, placed on separate tables in a room. These drawing activities are illustrated in Figure 2. The subject was shown how to draw cats, bugs,

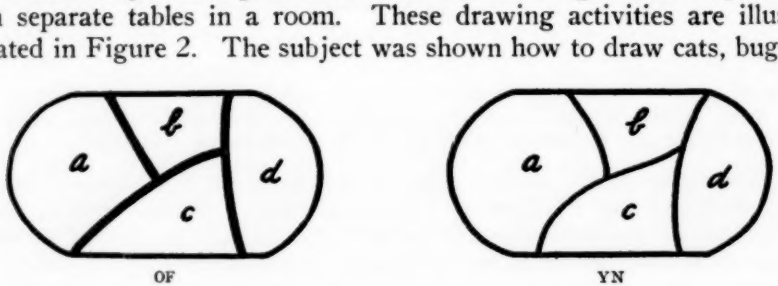

Fig. 1. Schematic Representation for Derivation-1

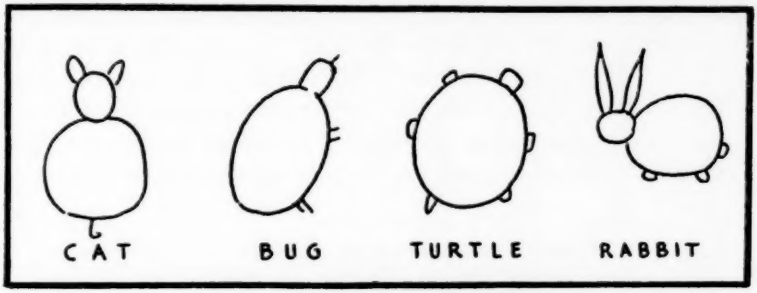

FIG. 2. OBJECTS DRAWN IN EXPERIMENT-1

turtles, and rabbits until he felt confident and secure in these activities. He was then allowed to draw cats until he became satiated and wanted to draw no more. After having become satiated with the drawing of cats, he was asked if he wanted to draw more bugs. After becoming satiated with drawing bugs, he was asked if he desired to draw more turtles. Finally, he was asked whether or not he felt like drawing more rabbits after having become satiated with drawing turtles. The situation was made as free as possible, and a minimum of pressure to continue drawing was placed upon the subject. (The degree of freedom actually created in the situations was indicated partly by the spontaneity in the general behavior and verbal expressions of the subjects, and partly by the fact that over 50 per cent of the subjects with which the experiment was started felt sufficiently free to refuse after the experimenter demonstrated the activities to them, or else drew objects entirely unrelated to the experimental situation.)

Since the old feeble-minded subjects can be characterized by a greater degree of rigidity (by postulation), satiation of the region of "drawing cats" should not markedly co-satiate the neighboring regions. The young normal subject is characterized by less rigidity; therefore the neighboring regions should be partly co-satiated in the process of satiating the "drawing cats" region.

An index of co-satiation was computed for each subject by using his satiation time on the first drawing activity as the basis of comparison. This co-satiation index was expressed by a percentage. The formula used was:

$$\frac{\text{Satiation time on cats minus satiation time on bugs (or turtles, rabbits)}}{\text{Satiation time on cats.}}$$

An index of 0 per cent or below (negative percentage) means that satiation of the cat-drawing activity had no effect upon the

bug-drawing activity. That is, the subject spent as much time drawing bugs as he did drawing cats. Conversely, a co-satiation index of 100 means that satiation of the cat-drawing activity resulted in complete co-satiation of the bug-drawing activity.

The mean co-satiation indexes of the three groups of subjects are given in Table 1[3] and are graphically represented in Figure 3.

TABLE 1

MEAN CO-SATIATION INDEXES OF THE THREE GROUPS OF SUBJECTS FOR THE DIFFERENT DRAWING TASKS

Subjects	Satiation-Time							
	$\frac{\text{Cats—Bugs}}{\text{Cats}}$		$\frac{\text{Cats—Turtles}}{\text{Cats}}$		$\frac{\text{Cats—Rabbits}}{\text{Cats}}$		$\text{Cats} - \frac{\left(\begin{matrix}\text{Bugs}+\\ \text{Turtles}+\\ \text{Rabbits}+\\ \text{Turtles}\end{matrix}\right)}{\text{Cats}}$	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Old feeble-minded....	14	—28	12	— 8	12	8	12	—10
Young feeble-minded.	17	39	17	52	16	66	16	54
Young normal.....	17	90	17	90	17	96	17	92
Old feeble-minded minus young feeble-minded.....	..	67	..	60	..	56	..	64
T (Fisher's).....	..	3.9	..	3.3	..	2.3	..	3.3
Old feeble-minded minus young normal.	..	118	..	98	..	88	..	102
T (Fisher's).....	..	7.6	..	6.2	..	4.0	..	6.0
Young feeble-minded minus young normal.	..	51	..	38	..	30	..	38
T (Fisher's).....	..	6.2	..	4.5	..	3.2	..	5.1

It can be seen that the least amount of co-satiation was evidenced in the old feeble-minded group, and the greatest amount of co-satiation obtained in the normal group. The differences between the three groups of subjects in the degree of co-satiation were revealed by quantitative time measures, by the qualitative nature of their overt behavior, and by the nature of their drawings. The behavior of the old feeble-minded subjects while drawing bugs, turtles, and rabbits was no different from their behavior while drawing cats. In contrast, co-satiation effects in addition to the quantitative time measures were markedly revealed in the case of the

[3] The number of subjects is not constant for all of the co-satiation indexes. This is due to the fact that some subjects spent so much time on the first or first few drawing activities that it became necessary to interrupt the experiment in order for the subject to have his noon or evening meal.

young normal subjects. They exhibited more tendencies to leave the field while drawing bugs, turtles, and rabbits than they manifested while drawing cats. They paused more frequently and for longer time intervals, engaged in nondrawing activities more often, and generally exhibited relatively more satiation symptoms (such as variations and mistakes) in the later drawing tasks than in the first drawing task.

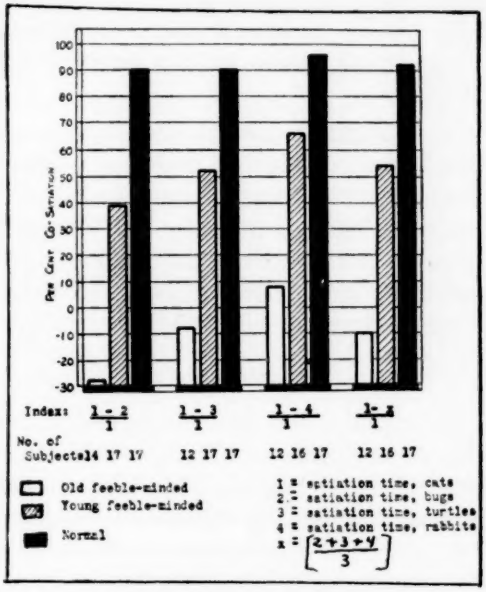

FIG. 3. MEAN CO-SATIATION INDEXES

There were also marked differences among the three groups of subjects with respect to the process of satiation, as such. The general progress of satiation in the old feeble-minded subjects revealed a more sudden and "all-or-none" character. They appeared to be either satiated or not satiated. The process of becoming satiated occurred in a much more gradual manner in the young normal group. These differences can be summarized as follows:

1. It required the most time to satiate the activity in the case of the old feeble-minded subjects, and the least time to satiate the same activity in the case of the young normal subjects. The differences in absolute satiation-time between any two of the three groups of subjects were all large and statistically significant.

2. The young normal subjects spent the greatest amount of time in nondrawing activities relative to the time they spent drawing, and the old feeble-minded subjects spent the least amount of time in nondrawing activities relative to the time spent in drawing.

3. The greatest number of old feeble-minded subjects stopped drawing only after finishing the last page upon which they were working. The greatest number of young normal subjects stopped drawing before finishing the last page upon which they were working.

4. The drawings of the old feeble-minded subjects were more regular with respect to size and other variations in the nature of the objects drawn; the drawings of the young normal subjects tended to be the least regular.

5. The drawings of the old feeble-minded subjects were most regular with respect to positional order on the pages (rows and columns); those of the young normal subjects displayed the greatest amount of positional variation.

It should be pointed out that the smaller amount of co-satiation found among the old feeble-minded subjects obtained *in spite of* their larger absolute satiation-times. Actually, the more time an individual spends in doing one activity, the less time he is likely to spend in subsequent related activities. The latter statement is supported by studies on satiation and co-satiation as well as by studies concerned with fatigue (**3, 5**).

Experiment II. Transfer of Habit

Logically, it is possible to derive certain effects of rigidity upon the psychological environment by assuming that the rigidity of inner-personal regions parallels the degree of functional segregation of neighboring regions in the psychological environment. This may apply to the independence of a region from its background. The more rigid the structure of the person, the more does the degree of influence (potency) of an immediate region approach unity, and the less does the background situation affect his behavior. By definition, it is necessary for two situations to have an effective degree of influence (potency) upon the person, in order for the person to be in an overlapping situation. It follows that the more rigid the inner personal regions of an individual, the less likely is he to be in an overlapping situation.

This experiment was designed to test Derivation-2. The general plan was to create a specific situation for each subject (Situation-1), to place the subject in another situation (Situation-2), and to note what effect Situation-1 had upon the subject while he was in Situation-2—i.e., to determine the degree to which the subject was in an overlapping situation.

The apparatus used was similar to that designed by Schwarz (**9, 10**) in his studies on unlearning. This consisted of a box into which marbles were introduced, one at a time. The subject could release the marble either by depressing or by raising a lever at the side. The mechanism was so designed that either depressing or raising the lever would release the marble.

Each subject was given three series of thirty trials each in which he released the marbles, one at a time, by depressing the lever. One third of the marbles were red, one third were black, and one third

were blue. After each marble was released by the apparatus to fall into a container, it was placed by the subject in a compartment corresponding to the color of the marble. This was done as rapidly as possible. Part of the situation was then changed by instructing the subject to raise instead of to depress the lever. There were two series (referred to as Situations D and E in Table 2) of thirty trials each in which the subject was required to raise the lever. The effect of the previous situation was determined operationally by the number of times the subjects entered (i.e., behaved appropriately to) that situation after having been placed in the second situation. Thus, the more errors made by the subject (depressing the lever), the more he was in an overlapping situation (being influenced by Situation-1 while in Situation-2).

On the basis of the theory, one would predict that the normal subjects would make the most errors—be most likely to be influenced by Situation-1 while in Situation-2—and that the old feeble-minded subjects would make the least number of errors or would be least likely to be in an overlapping situation.

A summary of the results are given in Table 2 and Figure 4. These results support the theory by showing that the normal subjects made the greatest number of errors, and the old feeble-minded subjects made the fewest number of errors. Thus, the old feeble-minded subject is least likely to be in an overlapping situation. He is either in the one situation, "pushing the handle down," or in the other situation, "pulling the handle up," but is rarely influenced by both situations simultaneously.

Experiment III. Card Sorting in Simple and Overlapping Situations

This experiment was designed to test Derivation-3. The general plan was to determine the ratio of the difficulty (as measured by time and errors) each subject had in the performance of a particular activity in a simple situation to the difficulty he had in the performance of the same activity in a more complex and more overlapping situation. Card sorting was the activity utilized. Each subject sorted cards in three simple situations and in one overlapping situation. The relative difficulty of the overlapping situation was determined for each subject, by comparing the time that he required to complete the activity in an overlapping situation with the time that he required to complete the activity in the three simple situations.

TABLE 2

ERROR RECORDS* OF THE THREE GROUPS OF SUBJECTS IN THE TRANSFER OF HABIT EXPERIMENT (20 SUBJECTS IN EACH GROUP)

	Old Feeble-Minded	Young Feeble-Minded	Young Normal	Difference Between: Young Feeble-Minded and Old Feeble-Minded	Difference Between: Young Normal and Old Feeble-Minded	Difference Between: Young Normal and Young Feeble-Minded
Total errors on Situation D	13	27	89	14	76	62
Total errors on Situation E	11	30	51	19	40	21
Total errors	24	57	140	33	116	83
Mean number of errors	1.20±.47	2.85±.97	7.0±.99	1.65	5.8	4.15
Critical ratio of differences in means	.....	.....	.....	1.53	5.32	3.01
Per cent of subjects making zero errors	55	15	0	40	55	15
Critical ratio of differences in percentages	.....	.....	.....	2.92	4.95	1.88

*Perseveration-errors (repetition of down strokes in consecutive sequence) were counted only as *one* error. The concern was with the number of times the subject entered the situation of pushing the handle down, and not with how long he stayed in that region after having entered it. Such repetition of single errors did not occur frequently, and would not change the results to any appreciable extent. (The investigations of Schwarz definitely show the difference between errors of relapse and perseveration-errors.)

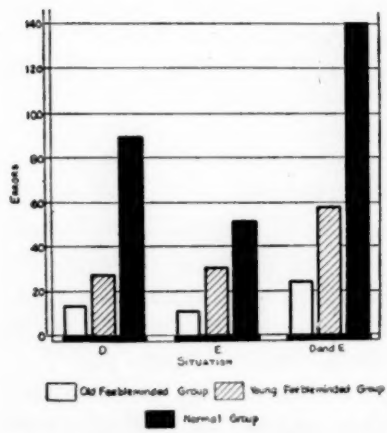

FIG. 4. ERRORS MADE IN TRANSFER OF HABIT EXPERIMENT

The equipment consisted of fifty-two solidly colored cards, equally divided into four colors—red, yellow, black, and green. Four bottomless boxes each colored to correspond to one of the card colors were fitted into a large carton.

Following are the three simple situations, in order of their performance:

A. The subject was required to deal the cards onto the table, one at a time, as rapidly as possible.

B. The subject was required to place the cards, one at a time, into one of the boxes, as rapidly as possible.

C. The subject was required to place the cards, one at a time, into a regular sequence of boxes, from the left side to the right side and back to the left to repeat the process, as rapidly as possible.

The overlapping situation is as follows:

D. The subject was required to place each card into the box of the corresponding color as rapidly as possible. The cards were thoroughly shuffled, no two colors following one another consecutively. The subject had to keep in mind both accuracy and speed, and both the color of the card and the color of the box. Since the boxes were bottomless, the subject was unable to correct an error, thus enabling the time-score to be more accurate by not involving the time used in correcting errors. The cards fell into compartments and it was possible to record the locus, sequence, and total number of errors.

The extent to which Situation-D (the overlapping, complex situation) was more difficult than the others, was measured by determining the percentage more time required for each subject to complete the activity in Situation-D than to complete the activity in the three preceding simple situations. Below is a tabulation of the results, including the mean number of errors made by each group of subjects. The results are presented graphically in Figure 5. There were twenty subjects in each group.[3]

Subjects	$\frac{\text{Time for } D}{\text{Time for } A}$	$\frac{\text{Time for } D}{\text{Time for } B}$	$\frac{\text{Time for } D}{\text{Time for } C}$	*Mean Number of Errors*
Old Feeble-minded.....	302	224	187	3.7
Young Feeble-minded.....	225	174	145	1.7
Difference	77	48	44	2.0
Critical Ratio	4.14	2.90	4.44	2.0

The above ratios were not functions of the absolute time required for the completion of the tasks. The same results obtained with pairs of young and of old feeble-minded subjects who were equated in terms of the absolute times required in the sample situations. The fact that the old feeble-minded subjects found the performance of a task in an overlapping situation relatively more difficult than did the young feeble-minded subjects tends to add additional support to the proposed theory of rigidity. The difference is not explainable by postulating a greater "cautiousness" in the case of the older subjects, since they actually made more errors than did the younger subjects.

Experiment IV. Integration by Classification

The following experiment was designed to test Derivation-4. The general method employed in this and in the following experi-

[3] This experiment was conducted with the old feeble-minded and young feeble-minded subjects. The number of times that the young normal subjects could be taken from their classrooms was limited. It was felt that this experiment could be eliminated with less loss than one of the others, since the young normal subjects' lack of the necessary motor coordination for the performance of this activity would complicate the comparative measures.

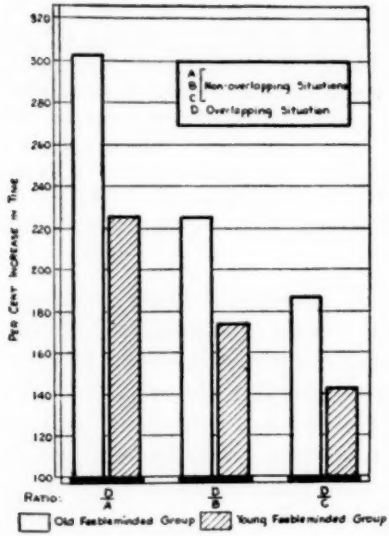

FIG. 5. RELATIVE DIFFICULTY OF AN OVERLAPPING SITUATION

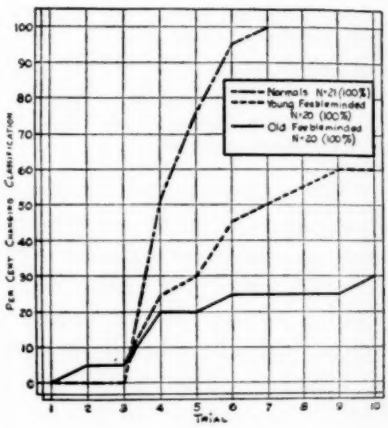

FIG. 6. CUMULATIVE PER CENT OF SUBJECTS CHANGING CLASSIFICATION

ment, Experiment V, has been used rather widely by other investigators for various problems (**2, 4, 11**). The procedure is to present a group of objects to a subject, some of which belong together in one "class," and to instruct the subject to arrange them in groups or categories. Such a method has been utilized in studies related to the thinking processes of individuals, especially with reference to "concrete" and "abstract-mindedness."

In this study, certain modifications were made in the general method in order to make it more applicable to the problem and suitable for the mental ages used. One general type of classification-test was utilized, but with four modifications. The modifications were proposed partly in order to attain the initial conditions required in the derivations, and partly in order to avoid the all-or-none character of "abstract vs. concrete" mindedness tests and theories as applied to feeble-mindedness.

Set-up A.—The initial condition specified by Derivation-4 supposes that the subjects are equally differentiated in equivalent areas. Set-up A was performed as a control experiment to insure the equivalent degree of differentiation of the different subjects.

Twenty-five cards were presented to each subject who was required to classify them into five groupings. There were five cards

of each of the following five colors: black, yellow, green, pink, and red. The instructions for all of the classification tests were:

> Here are some things all mixed up. Some of these are the same and belong together. Here are five boxes. Suppose you find some that are the same and belong together and put them in one of the boxes. Then find some others that are the same and put them in another box, then find some others that are the same and put them in another box, and keep on going until you have all those that are the same together.

All subjects succeeded in classifying the cards into five color categories without any apparent difficulty. This indicated that the subjects understood the directions and possessed the necessary color concepts.

Set-up B.—The purpose of this set-up was to ascertain the comparative behaviors of the subjects when required to structure a more ambiguous field than that of the first set-up. Twenty-five cards were used, five each of the following forms: triangles, squares, circles, crosses, and five-pointed stars. Those cards were painted with water colors in five shades of blue. The colors were perceptually of three rather distinct categories: five purplish-blue, five navy blue, and fifteen light blue. Of the light blue cards there were five of each of three shades, which varied little from one another. The cards can be described as possessing various forms easily discriminated from one another, as having some colors which were readily distinguished from one another, and as having still other colors which could be distinguished one from the other only with considerable difficulty. At times the individual perceived form to be more outstanding and at other times, color. No time limit was stated in either set-up, nor did the experimenter suggest in any way that speed was a factor in sorting.

Table 3 summarizes the results obtained from the three groups of subjects.

The behavior of the majority (62 per cent) of the old feeble-minded subjects can be summarized as follows:

1. The cards were classified in more than five groupings.
2. The groupings were not consistent with one another. Some were made on the basis of form; others, on the basis of color.
3. Minor differences between the cards were not overlooked.
4. The subjects compared but two or three of the cards at a time.
5. The general behavior of the subjects was of a typical trial-and-error variety.
6. The subjects manifested extreme "immediate-mindedness." Their classifications were dependent upon the specific card or pair of cards they

TABLE 3

BEHAVIOR OF THE THREE GROUPS OF SUBJECTS IN SET-UP B

Behavior Categories	Subjects		
	Old Feeble-Minded (N=21) Per cent	Young Feeble-Minded (N=20) Per cent	Young Normal (N=21) Per cent
Classify objects on the basis of form without verbal or behavioral consideration of color	19	60	19
Spontaneous classification on the basis of form, after having started on the basis of color	0	0	28
Inconsistent classifications (failure) followed by correct classification on the basis of form after experimenter's corrections	5	15	0
Classification on the basis of color*	5	0	0
Spontaneous classification on the basis of color, after verbal or behavioral consideration of form	0	0	9
Classified cards in fewer than five color categories, and changed to five categories after experimenter's correction	0	0	44
Inconsistent classifications, followed by classification on the basis of color after experimenter's correction	9	20	0
Failure to classify the objects consistently on the basis of form or color even after corrections of experimenter	62	5	0

*A color classification was correct if there were fewer than five errors, since some of the differences between colors were very difficult to discriminate.

happened to be considering. What they did in the "past" or planned to do in the "future" apparently had little or no influence upon their present behavior.

The majority (60 per cent) of the young feeble-minded subjects classified the cards into five form categories, without any evidence of confusion or consideration of color.

The behavior of the normal subjects differed from the behavior of both the young feeble-minded and the old feeble-minded subjects. The majority (44 per cent) of the normal subjects originally classified the objects on the basis of fewer than five color categories. Some of them put all of the "dark" blue cards in one category and all "light" blue cards into another. Others in this group classified the cards into three color categories: purplish blues (5), dark blues (5), and light blues (15). After the experimenter corrected them by saying: "There are supposed to be five in a box," the subjects classified the cards into five color categories. They evidenced no difficulty in making the correction.

Two other behavior categories were obtained with the normal subjects which were not observed in any of the other subjects. Twenty-eight per cent of the normal subjects started to classify

the objects on the basis of color, but before completing the sorting, spontaneously changed to a form classification. Nine per cent of the normal subjects started to classify the objects on the basis of form but spontaneously changed, before completing the trial, to sort the cards into five color categories. In all, 37 per cent of the normal subjects spontaneously changed their method of classifying the cards.

It has been shown that the concept of rigidity of boundaries in the structure of a person makes it possible to derive the relative independence of a region in the psychological environment from the regions neighboring and surrounding it. This proposition can then be applied to problems of the segregation of an immediate region from its background, to problems of overlapping situations (which, by definition, require at least two situations to have an effective degree of potency ("weight") in influencing behavior), to problems of the degree of unity and integration of paths, to problems of the effect of "past" and "future" upon a "present" field, and to any problem which involves the interdependence of regions.

The old feeble-minded subject is to be characterized by the greatest degree of rigidity, by postulation. Thus, the older and/or more feeble-minded an individual, the more is any subregion of activity involved in a task independent from the other subregions of activity. This prevents the activity as a whole from becoming unified. All the behaviors exhibited by an old feeble-minded subject can be shown to result from the more general premise of the relative lack of interdependence of regions in his psychological environment. The different units of activity in his path toward the solution of the task are functionally more segregated; as a result, the particular region in which he happens to be, dominates his behavior at the time. If the form quality of a pair of cards is perceptually most outstanding, he places the cards in a form-pile; if the color quality is most dominant in the next pair of cards, he places them in a separate color-pile; and he continues to make a considerable number of separate, independent classifications. The other types of behavior exhibited in the process of trying to solve the problem, such as the "immediate-mindedness," the lack of relationship between a "present" classification (i.e., form) and an immediately "past" classification (i.e., color), likewise follow from the general statement of the functional separation of one region from the others. The end-results of the performance are also derivable from the general proposition presented in the preceding paragraph. Thus, the old

feeble-minded subject ends with more than five groupings (more independent regions), and with groupings inconsistent with one another (functionally separated).

In the case of the young feeble-minded subject, both the form and color paths are unified and segmented into five regions. He takes the path which, as a whole, is more potent. As a rule, form is perceptually more outstanding than color due to the nature of the cards, and he takes the form path of classification. While in the region of form, however, the influence of color is negligible. As a result, the young feeble-minded subject neither changes his basis of classification spontaneously, nor does he give any indication of considering color.

The normal subject appears to be influenced by what he did in the past, and is in more of an overlapping situation than the feeble-minded subject. Hence, since he classified the cards in Set-up A on the basis of color, he classifies the cards in Set-up B on the basis of color, in spite of the fact that it is harder to do than it is to group the cards on the basis of form. In addition, there are fewer than five segmented regions in the color path of his initial classification; i.e., he groups the cards in two or three classifications. He easily segments the cards into five categories after the experimenter's correction. The fact that the normal subjects are in an overlapping situation to a greater extent and more readily restructure a field than the feeble-minded subjects (note Derivations 2 and 5) is indicated by their spontaneous changing of classifications from color to form, or vice versa.

Experiment V. Restructuring by Classification

This experiment was designed to test Derivation-5. The method is essentially that used in Experiment IV. The subject was experienced in both form and color classifications (in the previous set-ups). He was then presented with a group of cards, which consisted of the same forms and colors that he had experienced, to see whether he could make a change from one type of classification to the other while using the same group of cards. In addition, a method was planned to determine the amount of force necessary to apply to the different subjects in order to produce a change of their classifications, in order to get away from the "all-or-none" nature of "ability to change" concepts.

Set-up C. The twenty-five cards were made of the same forms utilized in set-up B of Experiment IV. All cards were made of

yellow cardboard. The procedure was the same as that employed in the other classification tests. This was used to give all subjects the experience of a form classification, as well as to insure that all could make form-abstractions.

All subjects were able to classify the cards into five form categories without any noticeable difficulty.

Set-up D. Twenty-five cards were used whose colors were the same as those used in set-up A of Experiment IV and whose forms were the same as those used in set-ups B and C. They were presented to the subject as previously (Trial 1). After he had classified the objects correctly, either on the basis of color or form (*all* subjects successfully performed the task by one method or the other), the experimenter reshuffled the cards and returned them to the subject with the instructions to "do them again" (Trial 2). If the subject did not change his method of classifying the cards after the second trial, the cards were reshuffled and he was asked to sort the cards "again" (Trial 3). Should the subject have continued on the same basis of grouping on Trial 3, the experimenter reshuffled the cards and gave them to the subject with the instructions to "put them together some other way" (Trial 4). If the subject still did not change his method of grouping the cards, the procedure was repeated, with the instructions stated as follows: "No, find some *different* way. See if you can find some *other* way that they belong together" (Trial 6).

This was continued for a maximum of ten total trials. In case the subject at any time refused to continue, he was urged to continue trying by such comments as: "Sure you can do it. If I thought that you couldn't do it, I wouldn't have asked you to come up. Go ahead, I know that you can find some other way to do it." Such statements always resulted in inducing a renewed effort from the subject.

All subjects were able to classify the cards into five groupings either on the basis of five forms or on the basis of five colors. Approximately the same number of subjects chose to classify the cards into color groupings as classified the cards into form groupings.

The relative number of subjects of each group who changed their classifications (restructed the paths) are presented in the Table 4 and in Figure 6 (p. 264).

TABLE 4

NUMBER OF SUBJECTS CHANGING CLASSIFICATIONS

Trial of Change	*Old Feeble-Minded (N = 20)*		*Young Feeble-Minded (N = 20)*		*Young Normal (N = 21)*	
	Number	*Cumulative Per cent*	*Number*	*Cumulative Per cent*	*Number*	*Cumulative Per cent*
2	1	5	1	5	0	
3	0	5	0	5	0	
4	3	20	4	25	11	52
5	0	20	1	30	5	76
6	1	25	3	45	4	95
7	0	25	1	50	1	100
8	0	25	1	55		
9	0	25	1	60		
10	1	30	0	60		
Per cent changing	30		60		100	
Per cent not changing	70		40		0	

It can be seen that the old feeble-minded subjects were least able to change from one to the other method of classification, and that the normal subjects were most able to change from one classification to the other. In spite of the fact that the greatest number of normal subjects changed their classifications, it required the least force to produce (in terms of the number of trials necessary and the strength of the experimenter's request).

SUMMARY AND CONCLUSIONS

The purpose of this study was twofold: (1) to arrive at a dynamic theory of age and of feeble-mindedness; (2) to determine the predictive value of some topological and vector constructs, especially those related to the concept of rigidity.

Two general theories were proposed: (1) that rigidity is a positive monotonous function of chronological age; (2) that rigidity is a positive monotonous function of the degree of feeble-mindedness. The latter is in reality a corollary of the first theory.

On the basis of the concept of rigidity in its postulated relationship to chronological age and to the degree of feeble-mindedness, five derivations were arrived at by means of a hypothetico-deductive method. These were:

Other things being equal, the older and/or more feeble-minded an individual:

1. The less effect a change of state in one region will have upon the state of neighboring regions.

2. The less likely he is to be in an overlapping situation.

3. The more difficulty he will have in the performance of a task which requires him to be influenced by more than one region.

4. The more likely is he to structure a new field which is perceptually ambiguous into a relatively large number of separate independent regions (achieve a less integrated structure).

5. The less easily he can perform a task which requires that he restructure a given field.

Experimental situations were devised to test each of the derivations. Three groups of subjects of equal Binet mental ages were utilized: (1) an old feeble-minded group; (2) a young feeble-minded group; and (3) a young normal group.

The results obtained showed definite differences between each of the three groups of subjects with respect to the propositions tested, thus indicating the validity of the theories.

The general conclusion is to the effect that any performance which requires a certain degree of communication between neighboring regions (the degree of communication being inversely proportional to the degree of rigidity) is to such an extent made difficult for the older and/or more feeble-minded individual. As far as these experiments permit one to generalize, the phenomenological nature of the performance is unimportant. The task may be predominantly of a cognitive nature (as in the classification experiments), of a motor nature (as in the card-sorting experiment), or of a "volitional" nature (as in the experiments on satiation and co-satiation). If a task is facilitated by the lack of communication between neighboring regions, such a task will be more efficiently and accurately performed by an older and/or more feeble-minded individual (as indicated by the "transfer of habit" experiment).

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EXPERIMENTAL STUDIES OF RIGIDITY

II. THE EXPLANATORY POWER OF THE CONCEPT OF RIGIDITY AS APPLIED TO FEEBLE-MINDEDNESS

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Ever since psychologists and educators have been aware of the diagnostic category of feeble-mindedness there has been an interest in the problem of the nature of the differences between feeble-minded and normal individuals. There is disagreement among authorities as to whether the differences which obtain between feeble-minded and normal individuals are of a "qualitative" or of a "quantitative" nature (**4, 12**). Experimental attempts to arrive at an understanding of the comparative nature of the psychological structure of feeble-minded and normal individuals might be classified roughly into the following three categories.

1. Comparison of the responses of normal and feeble-minded individuals on standardized tests. Much of the work in this area has been devoted to the enumeration of items on the Binet and other mental tests. This reveals a difference between feeble-minded and normal individuals of equal mental ages in terms of the percentages of each group which pass and fail on specific test items. Studies of the comparative scatter of normal and feeble-minded individuals have also been directed at this problem—the determination of the differential difficulty of various kinds of psychological tests. Such studies do reveal, in general, differences in the relative difficulty of specific items on standardized tests for feeble-minded and normal individuals of equated mental ages (**1, 6, 10, 14**). The assumption in these studies has been that these test-categories are representative of psychological categories. There is reason to believe that this assumption is only justified in part, and that the names given to tests do not necessarily represent the nature of the psychological processes involved in the performances.

2. Comparison of the learning ability of feeble-minded and normal individuals of equated mental ages. Practical educational problems and attempts to explain the slower rate of mental growth of feeble-minded individuals have given impetus to studies purporting to compare the learning ability of feeble-minded and normal individuals. Such studies have not revealed any consistent superiority of normal individuals in learning situations. Rather, normal individuals have been found, in general, to excel in certain types of learning tests (those requiring considerable "abstraction" and generalization), while feeble-minded individuals have been found to be superior in learning tests placing a premium upon motor facility and memorization (**11, 15, 16**).

3. Comparative studies of the cognitive processes of feeble-minded and normal individuals of equal mental ages. There have been a variety of experimental-test attempts to study the thinking process of normal and feeble-minded individuals. Drawing performances have been utilized frequently. Thus it has been found by different investigators that feeble-minded individuals, when given a drawing task, tend to include more details than normal individuals, but fail to coordinate and integrate the different details (**5, 7**). Free association tests, language usage tests, tests of abstract-concrete mindedness (such as various types of classification tests) have also been used to compare the thinking and problem solving processes of feeble-minded individuals with those of normal individuals (**2, 3, 13**). A majority of the studies point to a greater degree of abstract-mindedness of normal individuals and a greater degree of concrete-mindedness of feeble-minded individuals. Related findings indicate a greater preoccupation with immediately-present details in feeble-minded individuals, with relatively little integration of performances with more general plans.

The question as to whether the differences obtained between normal and feeble-minded individuals are of "degree" or of "kind" has not been answered by the above types of studies, at least if agreement among authorities is to be used as a criteria. (Most workers tacitly assume that postulating differences of a qualitative nature between feeble-minded and normal individuals is not necessarily inconsistent with the doctrine of the normal distribution of intelligence.) Unambiguous and consistent explanations of the slower rate of mental growth of feeble-minded individuals have not been proposed, except in terms of vaguely defined and untestable notions of "plasticity" and "ability to grow."

Another type of approach to the problem of the comparison ot normal and feeble-minded individuals has come from a consideration of general psychological theory. An example of such an approach is the dynamic theory of feeble-mindedness which has been proposed tentatively by Lewin (**9**). His theory is based upon the concept of rigidity, which, if verified, appears to possess explanatory power by permitting the conceptual derivation, not only of separate experimental findings, but also of more general events such as the slower rate of mental growth of feeble-minded individuals. Utilizing this approach, the particular problem of the nature of feeble-mindedness is embedded in a more general context of psychological problems and theory. A previous article (**8**) has been concerned with the validation of the rigidity theory as applied to the problem of age and of feeble-mindedness.

The research summarized in the preceding article is based upon one aspect of the general problem of the psychological structure of a person and the changes in such structure with development. It was assumed that the rigidity of the functional boundaries between regions of the person increases with chronological age. However, it was further shown that the measurement of rigidity necessitates controlling the variable of the degree of differentiation of a person, which is also postulated to increase with age. If the degree of differentiation is controlled, it is possible to obtain behavioral symptoms which can logically be related, under certain conditions, to rigidity of the person. Since one may assume that mental age can be coordinated to the degree of differentiation of a person, a comparison of individuals of equal mental ages but of unequal chronological ages would make it possible to develop comparative measures of rigidity. Such a procedure, which is dictated by methodological considerations, makes it necessary to study this aspect of the problem of development by utilizing subjects of different intelligence quotients. This makes it possible to arrive simultaneously at a theory of the comparative psychological structure of normal and of feeble-minded individuals.

There seems to be no doubt but that any science which is going to deal with questions of interdependence and explanation of events must utilize theory. It is no longer a question of whether psychology is to have theory or not to have theory, but a problem of what kind of theory it is to have. Moreover, it is not a simple matter of right or wrong approached with an all-or-none basis of selection. Rather, by a variety of criteria scientists are to evaluate any particu-

lar explanatory system. The criteria for the evaluation of a system apply both to its conceptual, logical-mathematical properties, and to its empirical, coordinating properties.

In the following discussion an attempt will be made to apply a few criteria of the evaluation of a scientific theory to the construct of rigidity. Since certain criteria, such as consistency, formal simplicity, and logical coherence, are meant to apply to a system as a whole (a network of statements or postulates), it is out of the scope of this paper to deal with them. Other criteria, such as testability, predictive and explanatory power, can be applied, however.

The recent interest in "operationism" has emphasized the need for using concepts which can be coordinated to concrete manipulations— theories which can be tested. One need not, however, restrict testability to direct manipulations—manipulations which follow directly from the operational definition of any particular construct. It is perfectly permissible, even desirable, to utilize indirect verifications—tests which follow from more than one logical step intervening between the construct and the validation of the construct.

The hypothetico-deductive method is generally advocated as an acceptable method of verification. This involves unambiguous conceptual definitions and the strict logical derivation of the description of specific events (singular propositions) from more general premises. These derivations (theorems) are then subjected to experimental tests. The more derivations that are arrived at and verified, the more adequately a particular theory is established.

A danger to be avoided as much as possible in using the hypothetico-deductive method is that of spurious predictability (e.g., being able to foretell certain events without explicit recognition of the explanation of why such events occur). There is sometimes a tendency to select those postulates that will lead to the results obtained. Excessive *ad hoc* theories of this nature can be avoided by deducing *new* phenomena (events not previously investigated), unexpected experimental results (contrary to existing viewpoints), or *paradoxical* results which can be shown not to be contradictory by aid of the particular theory.

In the previous series of experiments, the results obtained in the co-satiation experiments represent results which were *predicted* on the basis of the rigidity theory in its postulated relationship to feeblemindedness and to chronological age. To the knowledge of the investigator, these results are phenomena never before investigated. The formulation of these experiments came solely from the theory and not from any previous experiments.

The theory stated that rigidity is a positive function of chronological age and of the degree of feeble-mindedness. By definition, rigidity prevents an occurrence in one region from having an effect upon neighboring regions (as, for example, by a spread of tension from one region to another). Thus, a necessary conclusion is that the older and/or more feeble-minded an individual, the less will the satiation of one activity result in the co-satiation of neighboring activity-regions.

The results tend to give direct confirmation to the theory and are deduced from the theory with few intervening logical steps. Thus they reinforce the fruitfulness and lack of spurious predictability of the theory.

On the basis of the expressed viewpoints of many authorities on the nature of feeble-mindedness one would expect results contrary to certain of the results obtained. Authorities frequently refer to the fixity of feeble-minded individuals and their marked tendency not to change habits but to "stick to the same way of doing things." These theories lead one to expect that the feeble-minded individuals would make most mistakes when required to change their manner of performing a given task, and that the normal individuals would make the least number of errors or reversions to the previous method of performing a task. Precisely the opposite results were predicted from the theory of rigidity and were found to obtain in the particular situations and type of "unlearning" studied. The feeble-minded subjects made the fewest errors when required to perform a task by raising a lever after having developed the habit of depressing the lever.

The results obtained in the card-sorting experiments are also such as would not be expected on the basis of existing viewpoints. Most writers on the subject postulate that feeble-minded individuals excel in motor tasks. This holds true, however, only within rough limits. Actually, the old feeble-minded subjects required relatively more time and made more errors in a card-sorting activity when this activity was embedded in an overlapping situation (Situation D). This latter result was predicted from the rigidity theory.

A further advantage of the rigidity theory lies in its permitting the derivation of otherwise paradoxical results. On the basis of existing "trait" and "ability" theories as applied to feeble-mindedness, the results obtained from the transfer-of-habit experiments and the card-sorting experiments are contradictory. Thus, the feeble-minded subjects are more "cautious" in the transfer-of-habit experiment (make fewer errors) but are less "cautious" in the card-

sorting experiments. Both experiments would be traditionally classified as motor ability tests. The old feeble-minded subjects would then be said to excel in one motor ability test, and to be inferior to the normal or to the young feeble-minded subjects in the other motor ability test. As long as one remains on the level of description of events and phenotypical classifications (i.e., "motor performances") the results obtained in the above two experiments must remain as unsolvable paradoxes. With the aid of the concept of rigidity, however, the results are predicted and are no longer paradoxical. A logical implication of the rigidity theory is that regions in the psychological environment are independent from one another corresponding to the degree of rigidity of the person. When an activity is more efficiently performed, when regions are segregated, the older and/or more feeble-minded individual will excel. Such a condition maintains in the transfer-of-habit experiment. When an activity is more efficiently performed when the various activity regions influence one another, as in the last set-up of the card-sorting experiments, the less feeble-minded individuals excel.

The fruitfulness (giving direction to research) and testability of the rigidity concept are thus indicated. By means of such a genotypic, dynamic theory, one is enabled to derive new phenomena and a variety of phenotypically-different events. One experiment dealt with tension and will phenomena (satiation and co-satiation); others dealt with motor phenomena (transfer-of-habit and card-sorting); and still others were concerned with cognitive events (structuring and restructuring based upon modifications of "classification" tests).

Does the theory possess explanatory power in addition to the above and similar events? One event which has puzzled researchers in the field of feeble-mindedness is the problem of explaining the slower rate of mental growth of feeble-minded individuals. It appears that the rigidity theory makes an explanation of this question possible on three fronts: (1) Rigidity makes the occurrence of change more difficult. (Note co-satiation.) Assuming that mental growth involves change, rigidity thus operates to retard the rate of growth of individuals to be characterized as more rigid. (2) Assuming that environmental differentiation plays a role in mental growth, and generalizing from Derivation-2, one concludes that the same situation is less "stimulating" for a feeble-minded individual than for a normal individual. The normal individual is more likely to be in an overlapping situation—to be simultaneously influenced by more than one set of environmental regions. It follows that the same physical environment will be less effective psychologically in

the case of a feeble-minded individual than in the case of a normal individual placed in that environment. (3) Assuming that integration and restructuring (reorganization) play a role in mental growth, one is enabled to derive the slower rate of mental growth of the feeble-minded individual from the theorems which state that the normal individual more readily restructures a given field, and is more likely to attain integrated, unified structures.

To be sure, many psychologists have spoken of "plasticity" and have evoked plasticity notions to explain individual differences in the rate of mental growth. Such psychologists are likely to regard the rigidity concept as nothing new and smugly advocate common sense. Regarding "common sense" one must ask: Whose? Where? When? What? The plasticity theory does not seem to be defined in unambiguous conceptual terms or by strict operational manipulations. Such theories express an idea of such a degree of vagueness that no sharp derivations can be made. Nor are scientists completely justified in the blind worship of "newness." Psychological theory is not to be judged in terms of newness but rather in terms of adequacy, clarity, fruitfulness, testability, predictive and explanatory power. Theories which are more strict lead to predictions. They are "new" when "newness" is being defined as contributing to scientific progress.

Scientific explanation can be defined as the description of specific events from more general premises. In physics, for example, the descriptions of particular events (specific objects in motion) are derived from more general theories (constructs of force, mass, accelleration). There is no one level of explanation. Rather, there are different levels of explanation depending upon the generality of the theories and the number of events or, more precisely, the variety of types of events, that can be subsumed under the particular set of premises. Thus the atomic theory of matter is a higher-order theory because it enables one to subsume under it lower-order theories such as the classical laws of mechanics. One of the advantages of higher-order theories is that of parsimony and "thought economy." If one knows the higher-order theories one also knows the lower-order theories, the still lower "descriptive laws," and the "observable facts."

In Figure 1 the explanatory power of the concept of rigidity is revealed by noting the number of events which it is possible to derive from it. It is compared in this respect with the types of theories which have purported to explain the nature of feeble-mindedness.

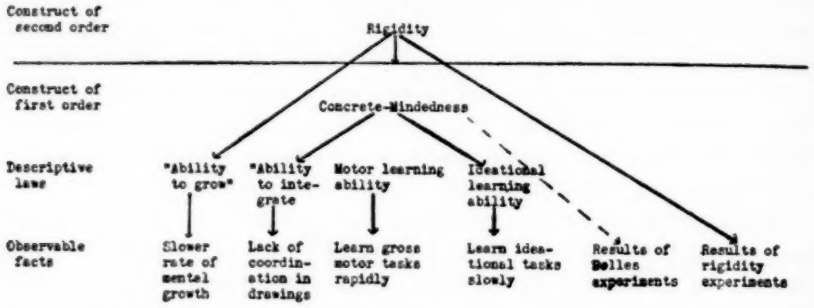

FIG. 1. A DIAGRAMMATIC REPRESENTATION OF THE EXPLANATORY-POWER OF THE RIGIDITY CONCEPT AS APPLIED TO THE PROBLEM OF FEEBLE-MINDEDNESS

On the observable fact level are such phenomena as the following: (1) In drawing tasks feeble-minded individuals draw many details but are inferior to normal individuals in representing proportions. Explanation of this and similar phenomena on the "descriptive law level" involves the postulation of some kind of ability, i.e., "ability to integrate," "ability to relate and to combine elements into a whole." Such explanations are on a slightly higher level than the observation of the facts themselves. These ability-constructs permit the derivation not only of the results on one particular drawing activity, such as drawing one particular man, but enable one to derive certain characteristics in a variety of drawing performances.

(2) In general, learning tests administered to normal and feeble-minded individuals of equated mental ages show no consistent superiority of one group over the other. Most studies find that feeble-minded individuals learn sensori-motor and memory tasks more rapidly than normal individuals, while normal individuals learn ideational and generalization tasks more rapidly. The explanation on the "descriptive law level" involves the postulation of specific learning abilities, the feeble-minded individual possessing more "motor-learning ability" while the normal individual possesses more "ideational learning ability." Such constructs do not progress much above the facts, but repeat on the conceptual plane what has been found on the "fact plane." At the same time, they do possess some thought economy virtue since they allow one to derive results obtained on more than one specific learning task.

(3) Item-analyses of such tests as the Binet reveal differences in the relative difficulty of specific test items for feeble-minded and for normal individuals. In general, tests involving considerable

experience, memory, and concrete performances are passed by a greater percentage of feeble-minded subjects. Tests placing a premium upon abstractions, adaptations to new situations, seeing relationships, are passed by a greater percentage of normal individuals. Explanations of such phenomena have ordinarily been on the same level as the types of explanations previously mentioned. These explanations involve the postulation of abilities to account for the results obtained from the test analyses.

(4) As measured by standardized tests, the rate of mental growth of feeble-minded individuals is, under ordinary circumstances, slower than the rate of mental growth of normal individuals. Since learning tests have not revealed a consistent superiority of normal individuals over feeble-minded individuals, it has become necessary to differentiate between the ability to learn and the ability to grow psychologically. The explanation of the phenomena of the slower rate of mental growth, then, involves another descriptive construct evoking an ability, sometimes vaguely referred to as plasticity.

Low-order descriptive explanations, as mentioned above, are not wrong providing that they are testable. The defect in such theories is that they are more descriptive than explanatory. They are inclined to be circular with a considerable element of the *ad hoc* because they tend to explain only the facts for which they were postulated. Such theories tend to be sterile because they lead to a very limited number of deductions.

Theories slightly higher than the descriptive level have also been proposed. Such studies and explanations as those of Bolles (2) are of value in this respect. With respect to the problem of feeble-mindedness, these higher-order theories are, in general, concerned with such constructs as "abstract and concrete mindedness." These theories are on a higher level than the previously mentioned descriptive theories because they cover more ground and permit the derivation of more events. Thus, it is *roughly* possible to derive from the theory that feeble-minded individuals are more concrete-minded than normal individuals many of the facts observed in comparative drawing studies, in item-analysis studies of the Binet, and in Bolles's classification tests.

The rigidity theory can be regarded as a theory on a still higher level because it leads to still more derivations. It permits the derivation of the events derived by postulating "concrete-mindedness" of the feeble-minded individual and can subsume the latter

theory under it. (This is limited, of course, to situations where the degree of differentiation is constant.) In addition, it predicts the results obtained in the experiments cited in the previous article, which could not be logically derived from the abstract-concrete mindedness concept. Moreover, it also derives the slower rate of mental growth of the feeble-minded individual, a fact which has not been adequately explained by the other, and lower-order theories.

The experiments reported in the previous article, then, are a partial demonstration of the fruitfulness and explanatory power of certain topological and vector concepts. It is hoped that these studies will indicate how the relationship between experiment and theory can be obtained, and how new research and knowledge may be secured by attention to theory as well as to "fact." The necessity for constructing relevant psychological theory is especially apparent in the area of personality, where the structure of a person must be a postulated type of structure.

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AN ANALYSIS OF THE CONCEPTION OF MORALE

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In Warren's *Dictionary of Psychology* "morale" is defined as: "the individual (or more generally the group) attitude in respect to confidence, perseverance in work, and adherence to ideals. Synonym: esprit de corps." Social psychologists have used the term in a number of different ways. F. Allport[1] considers that cooperation between members of a group for the advancement of the interests of the group is the main factor in esprit de corps. According to McDougall,[2] group spirit depends on the existence in the mind of each individual member of a clear knowledge of the group and of his place in it, and of a sentiment of devotion to it. Thouless[3] also stresses group loyalty, and Murphy and Newcomb[4] appear to identify morale with social cohesion and cooperation, demoralization occurring when there are negative attitudes between group members. Bartlett,[5] in his discussion of morale in an army, defines it as: "obedience to authority under external circumstances which impose great strain, the source of authority being within the man, or the group, that is obedient." His conception is closely akin to McDougall's theory of the self-regarding sentiment as a higher mode of controlling conduct than externally imposed discipline. Dashiell[6] regards morale as a supremely important human drive, and states that it involves energetic, tenacious, and constructive activity, backed by emotions of zest, confidence, and hope. Underlying it are such factors as good physical health and strong ideals.

In Britain at the present time such terms as morale, demoralization, and defeatism are frequently employed without being clearly

[1] Allport, F., Social psychology. Boston: Houghton Mifflin, 1924.
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defined. The conceptions in the minds of political speakers, newspaper writers, and others, seem indeed to embody a large number of diverse qualities which may or may not be closely related. Here is a field, then, where the application of factorial analysis should be of considerable value in showing how far such qualities are interconnected, and whether the notion of morale embodies a single general factor, or a number of distinctive traits.

It was not possible, in the time available to the writer, to devise any effective method of investigating group, as distinct from individual, morale. Nor did it appear feasible (although certainly desirable) to base the analysis upon direct observation of people's behavior. The present study is therefore solely an analysis of opinions and attitudes relating to morale. And it is published partly in the hope that American psychologists, who have better facilities for large-scale investigations, may be tempted to extend its scope and to improve on its technique.

Methods of the Investigation

Seventeen qualities were selected and arranged in the form of a graphic rating scale. It is not claimed that these qualities cover all aspects of the conception of morale. For though they include most of the traits mentioned by Dashiell and by Warren's *Dictionary*, they omit such characteristics as apply primarily to groups, or which could only be observed in group situations. They were in fact chosen as being the qualities of an individual which might be observed and assessed during an interview with the individual, or judged on the basis of a slight acquaintanceship with him. The rating scale, with instructions, is reproduced below.

Attitudes to the War

You are asked to rate or assess a person on the qualities or attitudes listed below. The person may either be an unknown one, with whom an interview has been held, or an acquaintance (or yourself). Neither your own name, nor that of the person you are rating, is wanted; this is completely anonymous.

In rating a person on these qualities, read through Quality No. 1 till you get its meaning, then consider the person's average behavior, speech, and opinions. If 1*a* seems to describe him best, then make a cross beside *a*; similarly if *b, c, d,* or *e* fits him. Regard *b* as intermediate between *a* and *c, d* as intermediate between *c* and *e*. Don't be afraid to use the extreme descriptions (*a* and *e*) whenever they seem to apply.

Then go on to Quality No. 2 and rate the person in the same way. Deal with the successive qualities quite independently of one another. The person is not likely to be either high in all qualities or low on all.

Qualities

1. a. Very intelligent and sensible in his opinions about the war
   b.
   c. Average, fairly sensible
   d.
   e. Muddleheaded and illogical in his talking and thinking
2. a. Very cheerful and happy in spite of hardships (at the present time, not necessarily about the future)
   b.
   c. Generally cheerful, occasionally depressed; or balanced mood
   d.
   e. Melancholy, depressed disposition
3. [7] a. Strong, unyielding convictions about war issues (either pro- or anti-), very stubborn
   c. Moderately determined and certain of himself
   e. Easily led, yields to suggestions
4. a. Very considerate of needs and opinions of other people, also of other nations
   c. Average consideration of personal and nonpersonal concerns
   e. Solely concerned about self or immediate relatives
5. a. Full of enthusiasm and determination to support the national cause
   c. Moderate confidence, some doubts or lack of enthusiasm
   e. Apparently apathetic and indifferent, no enthusiasm
6. a. Rational and open-minded, no delusions about the real state of affairs
   c. Generally rational but some blind spots
   e. Much "wishful thinking" and rationalizations
7. a. Readily adapts to hardships, good manager, resourceful
   c. Fairly resourceful, some difficulties in adaptation
   e. Unadaptable, can't manage under difficulties
8. a. Extremely tolerant of views opposed to his own
   c. Average; fair toleration, some biases
   e. Prejudiced and intolerant of the opinions of others
9. a. Interested in political and economic problems, in intellectual and idealistic matters
   c. Moderate intellectual-idealist, mainly material-personal, interests
   e. Interested only in material and personal considerations
10. a. Willing to go without, quite uncomplaining about hardships
    c. Puts up with a lot, but some complaints
    e. Querulous, strongly resents hardships
11. a. Opinions constructive and well thought out even if critical
    c. Neither very constructive, nor destructive
    e. Destructive and aggressively critical views, mere grudges
12. a. Fatalistic or philosophical, stolid view of the future
    c. Some imagination, but controlled
    e. Unduly imaginative (either optimistically or pessimistically)

[7] In the remainder of the items the lines corresponding to choices b and d are here omitted.

13. a. Trustful in political, military and economic leaders
    c. Generally trustful, some suspicions
    e. Very suspicious, disapproving of many of the authorities
14. a. Very hopeful, perhaps over-optimistic attitude to the future
    c. Qualified optimism
    e. Considerable anxiety about the future
15. a. Stable and trustworthy in the face of present (and possible future) difficulties
    c. Generally calm, sometimes liable to be upset
    e. Excitable, unstable, easily unbalanced
16. a. Good health, strong, plenty of vitality
    c. Average health and vigor
    e. Weak and feeble, or suffering from disabling sickness
17. a. Outstandingly confident and well adjusted in all phases of life (quite apart from the war)
    c. Generally confident, some anxieties or minor maladjustments
    e. Anxious, worrying, timid in personal and social adjustments

The raters consisted of thirty persons, either psychologists or senior students in psychology classes. Most of them provided two to four complete sets of ratings, though a few only managed one set, and three did six sets each, two did fourteen sets each. In all, one hundred sets of ratings were secured. As may be seen from the instructions, all rating was anonymous so as to insure as complete frankness as possible.

Half of the ratings referred either to acquaintances or to the raters themselves (i.e., self-ratings). The majority of this set of "ratees" consisted, therefore, of professional persons such as schoolteachers or their relatives. The other half referred to a group of persons unknown to the raters, persons who had recently been interviewed by trained interviewers in an endeavor to obtain information about their attitudes to the war. The raters were provided with full records of these interviews, and, after reading each record, rated the interviewee on the seventeen qualities. This group consisted of twenty-three persons of varied socio-economic status, mostly factory workers, small shopkeepers, and the like. Since each interviewee was rated by two or three raters, the total number of interviewee ratings (like that of acquaintance ratings) was fifty.

Owing to the marked differences between the two groups of ratees, the intercorrelations of the seventeen qualities were calculated and factorized separately. The reliability of the interviewee ratings was obtained by comparing the assessments of the two or three raters who had studied each interview. There were thirty-

three of these pairs. No estimates of the reliability of acquaintance ratings could be obtained.

Each rater gave from one to three estimates of the certainty or doubtfulness of his ratings, in accordance with the following instructions. In both sets of ratings, twenty-nine such estimates were obtained for each of the qualities.

After rating each quality, add one of the letters, C, C–, D, or DD.

C means that you are certain of your rating and found the quality unambiguous and easy to rate.

C– means moderately certain and easy to rate.

D means some doubt and uncertainty in deciding on your rating.

DD means that you found the rating very difficult or that the quality seemed to you vague or ambiguous.

Results

The main results, other than the intercorrelations, are listed in Table 1. The means of the ratings on each quality are expressed

TABLE 1

Means and Dispersions of Ratings, Significance of Differences in Means, Certainty and Reliability

Qualities	Acquaintances		Interviewees		$\frac{M_a - M_i}{\sigma_{diff.}}$	Certainty or Doubt	Reliability of Interviewee Ratings
	M_a	σ_a	M_i	σ_i			
1. Intelligent	+.62	1.28	−.34	1.18	+3.9	2.21	.73
2. Cheerful	+.32	0.93	+.04	1.37	+1.2	2.30	.76
3. Stubborn	+.36	1.25	+.08	1.35	+1.1	2.16	.63
4. Considerate	+.28	1.31	−.56	1.27	+3.3	2.08	.54
5. Determined	+.30	1.24	−.16	1.32	+1.8	2.08	.69
6. Rational	+.52	1.29	−.36	1.16	+3.6	1.94	.26
7. Adaptable	+.90	1.15	+.18	1.34	+2.9	2.18	.53
8. Tolerant	.00	0.92	−.28	1.06	+1.4	1.98	.52
9. Idealistic	+.44	1.44	−.90	1.27	+4.9	2.24	.68
10. Uncomplaining	+.34	1.09	+.12	1.48	+0.8	2.22	.70
11. Constructive	+.76	1.05	−.18	1.09	+4.4	2.23	.56
12. Stolid	+.20	1.11	+.22	1.22	−0.1	2.04	.52
13. Trustful	+.18	1.18	+.24	1.38	−0.2	2.07	.83
14. Optimistic	−.12	1.18	−.02	1.33	−0.4	2.17	.40
15. Stable	+.32	1.21	+.04	1.39	+1.1	2.21	.71
16. Healthy	+.64	1.11	−.12	1.18	+3.3	2.38	.65
17. Self-confident	+.22	1.10	−.36	0.95	+2.8	2.15	.52

numerically by making $a = +2$, $b = +1$, $c = 0$, $d = -1$, $e = -2$. The certainty or doubt estimates are obtained by making C = 3, C– = 2, D = 1, DD = 0.

It may be seen that for both groups of ratees, the means on all qualities lie between +1.0 and −1.0, i.e. between *b* and *d*. There are, however, big differences between the means of the two groups, whose critical ratios are listed in the fifth column. The raters

regard themselves and their personal acquaintances as outstandingly more intelligent, considerate of other people and nations, rational, idealistic, constructive, and more healthy, than the miscellaneous interviewees. They are less stolid about the future, trustful in leaders, and optimistic, but these differences are not significant. Such findings are very much what might have been expected of professional persons and psychologists. Their self-halo stresses the intellectual more than the social qualities, and tends to despise the uncritical qualities.

The reliability coefficients, which average 0.60, are satisfactory considering the amount of information about the interviewees available to the raters, and the generally low consistency of all ratings. Estimates of doubt and certainty were extremely variable, so that any differences between figures in the penultimate column of the table are of little significance. The difference between the most certain quality, health (2.38), and the most doubtful, rationality (1.94), is only 2.57 times its S.E. On the whole, the more certain traits are the more reliable, the rank order correlation between the last two columns being $+ 0.49 \pm .13$. Combining these two criteria —reliability and certainty—we find that the most rateable qualities are: Nos. 2. cheerful, 16. healthy, 1. intelligent, 9. idealistic, 10. uncomplaining, and 15. stable. The least satisfactory are: Nos. 6. rational, 8. tolerant, 12. stolid, 17. self-confident, 14. optimistic, and 4. considerate. The latter are presumably more complex, more vague, or less clearly defined than the former, and they should be revised or omitted in a future rating scale.

The correlations between the qualities are given in Table 2, the coefficients for acquaintances above the diagonal, and those for interviewees below. The P.E. of zero coefficients (for fifty cases) $= \pm .095$. It will be seen that the great majority of coefficients are positive. The most interesting feature is the number of big discrepancies between the correlations for acquaintances and those for interviewees; among about one quarter of the coefficients the differences are more than three times their P.E.'s. Presumably they are due to the different attitudes of the raters to the two groups. Nonetheless, as we shall see below, the two sets of intercorrelations may be resolved into much the same factorial patterns.

Three factors were extracted from each set of correlations by Thurstone's method, and the saturations and communalities are listed in Table 3. Here, too, there is little resemblance. It may be objected that the correlations can only legitimately yield one sig-

TABLE 2
CORRELATIONS BETWEEN QUALITIES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Intelligent		.22	.50	.54	.10	.75	.38	.34	.51	.45	.63	.08	−.31	.06	.35	.13	.34
2. Cheerful	.56		.10	.30	.13	.23	.20	.19	.10	.23	.22	.07	.15	.50	.37	.21	.29
3. Stubborn	.11	−.15		.23	−.10	.38	.18	.05	.51	.44	.42	−.09	−.27	−.12	.27	.30	.42
4. Considerate	.66	.53	.05		.23	.53	.27	.44	.49	.49	.28	−.04	−.01	.11	.53	.03	.36
5. Determined	.61	.65	.24	.57		.27	.22	.12	.22	.42	.24	.16	.30	.20	.15	.11	.04
6. Rational	.55	.55	.01	.57	.51		.36	.24	.54	.55	.67	.12	−.08	.03	.38	.08	.22
7. Adaptable	.56	.72	−.03	.53	.49	.48		.25	.29	.55	.33	.20	.00	.36	.48	.10	.40
8. Tolerant	.54	.70	−.50	.45	.36	.41	.52		.23	.24	.08	−.04	−.09	.20	.45	.10	.10
9. Idealistic	.56	.41	.34	.55	.54	.46	.41	.10		.34	.57	.16	−.39	−.04	.33	.25	.22
10. Uncomplaining	.50	.72	−.29	.49	.44	.49	.73	.64	.23		.40	.03	.12	.22	.56	.22	.49
11. Constructive	.59	.64	−.13	.52	.55	.41	.42	.46	.46	.60		.28	−.16	.16	.41	.27	.48
12. Stolid	.43	.54	−.01	.37	.38	.39	.55	.42	.14	.54	.24		.05	.26	.25	.20	.34
13. Trustful	.63	.76	−.22	.39	.59	.43	.60	.73	.18	.67	.62	.57		.40	.09	−.13	.08
14. Optimistic	.48	.60	.17	.39	.44	.24	.68	.32	.34	.53	.42	.52	.60		.46	.12	.22
15. Stable	.65	.72	−.06	.65	.58	.44	.73	.59	.36	.79	.68	.69	.67	.66		.42	.64
16. Healthy	.36	.45	.20	.25	.34	.25	.45	.09	.24	.30	.30	.30	.29	.47	.52		.57
17. Self-confident	.51	.61	.27	.59	.65	.42	.63	.35	.39	.52	.41	.48	.50	.65	.71	.58	

TABLE 3
FACTOR SATURATIONS AND COMMUNALITIES OF RATINGS

Qualities	INTERVIEWEE FACTORS			h^2	ACQUAINTANCE FACTORS			h^2
	I	II	III		I	II	III	
1. Intelligent	+.76	+.16	+.30	.70	+.74	+.46	+.13	.77
2. Cheerful	+.88	−.16	−.04	.80	+.42	−.26	+.17	.27
3. Stubborn	−.04	+.74	+.05	.55	+.49	+.30	−.29	.41
4. Considerate	+.71	+.22	+.32	.65	+.61	+.18	+.37	.54
5. Determined	+.71	+.23	+.21	.60	+.30	−.21	+.21	.18
6. Rational	+.63	+.08	+.28	.48	+.70	+.34	+.21	.66
7. Adaptable	+.81	+.09	−.24	.72	+.58	−.19	+.14	.40
8. Tolerant	+.69	−.54	+.06	.77	+.40	+.05	+.33	.27
9. Idealistic	+.49	+.41	+.42	.59	+.65	+.43	−.18	.64
10. Uncomplaining	+.81	−.27	−.16	.76	+.69	−.12	+.21	.53
11. Constructive	+.71	−.16	+.24	.59	+.71	+.16	−.22	.58
12. Stolid	+.64	+.06	−.31	.50	+.26	−.28	−.24	.19
13. Trustful	+.80	−.31	−.06	.74	−.07	−.57	+.34	.44
14. Optimistic	+.69	+.17	−.36	.63	+.32	−.58	+.28	.52
15. Stable	+.90	+.04	−.18	.84	+.75	−.30	+.06	.66
16. Healthy	+.48	+.29	−.28	.40	+.43	−.23	−.47	.46
17. Self-confident	+.73	+.39	−.19	.72	+.65	−.33	−.35	.65
Per cent of Variance	49	10	6	65	30	11	7	48

nificant general factor. Admittedly, after the removal of the first factor, the mean of the residuals is only 0.100, which is just about equal to its P.E.; hence the residuals might be ascribed to chance. The number of cases, fifty, is too small for the second, still less the third, factor to be highly significant.[7a] The excuse, however, for

[7a] Burt points out that two hundred and fifty cases are generally required to establish three factors. Burt, C. L., The factors of the mind. London: Univ. London Press, 1940.

continuing the analysis beyond one factor is that it eventually leads to a logical, even if very tentative, picture of the underlying components of the conception of morale, a picture which is very similar for both sets of ratings; whereas the extraction of one factor in each set does not provide a result which may be readily interpreted for either set, and certainly not for both sets. It is to be hoped that a similar investigation will be carried out with a larger number of subjects which will provide more definite results.

An important feature of Table 3 is the higher level of communalities for almost all the qualities among the interviewees than among the acquaintances. Indeed, a comparison with the reliabilities given in Table 1 shows that the communalities usually equal or exceed the reliabilities.[8] Apparently, then, there are no specific factors involved in any of the traits, except possibly in No. 16, health, whose communality is 0.40, and whose reliability is 0.65. This means, as might have been anticipated, that the raters of interviewees are unable to discriminate the different traits, and that the general impression which they obtain from studying an interview can be wholly analyzed into a few common factors + unreliability.

Now the acquaintance ratings are probably more reliable, since they are accompanied by significantly greater estimates of certainty than are the interviewee ratings. The average certainty estimates were 2.35 and 1.97, respectively. Here, then, specific factors are far more prominent, and the raters make much finer discriminations between the traits.

Rotation of axes gives the three factors, for both sets of data, whose saturations are listed in Table 4. It was not found possible to eliminate all negative loadings, or to obtain a better approximation to "simple structure." This particular transformation was preferred to other possible ones largely because it makes the relative saturations of the interviewee and acquaintance factors very similar. The rank correlations between the first two columns $= +0.80$, between the second pair $= +0.73$, and between the third pair $= +0.46$. By contrast the resemblance between the two general factor saturations listed in Table 3 amounts only to a rank correlation of $+ 0.23$. The interpretation of the first two rotated factors is obvious, though the third factor is less clear-cut.

Factor I may be regarded as a general factor, in spite of its occasional small or negative loadings. It chiefly represents stability,

[8] As Thomson has shown, the unreliabilities of different traits may quite well be correlated, so accounting for the communalities exceeding the reliabilities. Thomson, G. H. The factorial analysis of human ability. London: Univ. London Press, 1939.

optimism and trustfulness, cheerfulness, uncomplainingness, and adaptability to hardships. Tolerance, self-confidence, and determination are also significantly saturated. Stubbornness is negatively loaded, meaning that this type of morale is somewhat suggestible and easily led. It is also little concerned with intellectual or idealistic matters (No. 9).

TABLE 4
ROTATED FACTOR SATURATIONS

	Factor I		Factor II		Factor III	
	Interviewee	Acquaintance	Interviewee	Acquaintance	Interviewee	Acquaintance
15. Stable	+.85	+.61	+.15	+.33	+.30	+.42
14. Optimistic	+.69	+.72	−.09	.00	+.39	−.02
13. Trustful	+.83	+.54	+.22	−.21	−.07	−.31
10. Uncomplaining	+.86	+.50	+.13	+.47	−.03	+.26
2. Cheerful	+.87	+.47	+.27	+.19	+.10	+.13
7. Adaptable	+.78	+.48	+.06	+.32	+.33	+.25
8. Tolerant	+.75	+.27	+.30	+.45	−.34	−.01
5. Determined	+.50	+.39	+.44	+.17	+.39	+.02
12. Stolid	+.56	+.26	−.07	−.12	+.26	+.35
1. Intelligent	+.54	+.02	+.55	+.80	+.33	+.35
4. Considerate	+.46	+.28	+.55	+.77	+.36	+.09
6. Rational	+.44	+.13	+.49	+.75	+.22	+.27
11. Constructive	+.60	+.13	+.47	+.43	+.01	+.62
9. Idealistic	+.18	−.12	+.57	+.57	+.49	+.55
17. Self-Confident	+.61	+.43	+.08	+.04	+.59	+.68
16. Healthy	+.45	+.21	−.09	−.10	+.44	+.64
3. Stubborn	−.27	−.12	+.03	+.35	+.69	+.53
Per cent of Variance	41	15	11	18	13	15

Factor II is undoubtedly an intellectual-rational group factor, emphasizing impartial and constructive versus prejudiced or muddled thinking, consideration of other people and nations, and interest in political or economic problems and ideals instead of personal and material matters. Naturally the factor is more prominent among the acquaintances, though it also comes out in the interviewee ratings. Actually the differences between the mean ratings for the two groups, listed in Table 1 (which were shown to represent the professional class "halo") give rank correlations of +0.55 and +0.64 with these two sets of factor loadings. The qualities with zero or negative loadings also help in the interpretation, namely: stolid, healthy, optimistic, self-confident, and trustful in leaders. Intellectual people are not, of course, necessarily lacking in these qualities, but they may be either high or low in them.

Factor III appears at first sight to represent a determination-vigor component, a kind of "bull-dog" mentality. The highest saturations are: stubborn (nonsuggestible), healthy and self-confident. There are negative saturations for tolerance and trustfulness. But several qualities have loadings which are incongruent with this interpretation. Thus determination or enthusiasm for the national cause is no more saturated than considerateness or optimism. Constructive thinking is high among the acquaintances but not the interviewees, and political-economic interests and ideals are high in both groups. Probably these inconsistencies are partly due to the lack of sympathy among the raters with this type. Further study by the writer of the interview records suggests that those rated high on this factor are persons such as trades union leaders, with aggressively critical views, who are very keen on better management of the country's economic and foreign policy. The factor is strongly reminiscent of Spranger's political type, just as Factors I and II resemble his social and theoretical types, respectively. Actually the writer had no thoughts whatever of Spranger's typology when planning the investigation, constructing the rating scale, or rotating the axes.

Discussion and Conclusions

The conception of morale revealed by this investigation does seem to involve a single very generalized quality. In the view of the raters all the traits mentioned in the introduction, and most of those embodied in the rating scale, tend to hang together. Confidence, obedience, perseverance, resistance to hardships, social cohesion, and cheerfulness seem to be its chief characteristics. This generality is most marked, however, in judgments of persons with whom the raters are not well acquainted. Persons who are known only at second hand tend to be regarded as high on all such traits, or low on all. But when judging close acquaintances, there is considerably more differentiation; the generalized concept breaks down into more specific traits or group factors. The precise nature of this differentiation cannot be established owing to the lack of reliability of the data (both the unreliability of the ratings and the small number of cases). It is clear, however, that well-educated and intellectual people such as the raters lay very special stress on a rational, liberal, altrocentric outlook, and even regard this as more important than social and dynamic qualities among themselves and their personal acquaintances. They consider the more general type of morale as rather "sheepish" although doubtless very desirable for the majority of the population.

Many might claim, however, that this group factor has little if anything to do with morale, as commonly understood, and that it turns up in the present results merely because the writer included traits of this type in his rating scale. Surely, though, it is arguable that this is the factor which has been most outstanding in the attitudes of the British to the present war, as contrasted with those of the French and Germans. Compared with the war of 1914-18, there has been much less blind fervor, less irrational projection (in the psychoanalytic sense). Widespread and fantastic rumors have been conspicuously rare; the freedom of the press has been more jealously guarded, and the activities of the censor and of emotional propagandists more criticized. Those who support the war chiefly because they hope that it will lead eventually to a more rational and more democratic organization of society, and who therefore press for the enunciation of war and peace aims, may be only a minority of the population. But they certainly seem to be more numerous and more vocal than in any wars in the past. At the same time the relative independence of this factor from the general factor, as shown in the results of this study, helps to explain why so many persons in authority, whose whole energies are devoted to the national cause, are apparently unsympathetic to the rational-idealist outlook.

Other group factors are suggested by the results, but need more comprehensive investigation before they can be accurately specified. A forceful-enthusiastic type might perhaps have been anticipated; but quality No. 5, which should have been most highly saturated with such a factor, is actually found to enter to a greater extent into the general factor and the rational group factor than into Factor III. Instead, there seems to be a dynamic, leader type which is more dogmatic, less liberal and tolerant than the rational-idealist type. Very possibly other distinctive types would emerge from ratings by persons of a different outlook, or from ratings of more representative samples of the population. Nonetheless, it is a very interesting psychological point that the technique of factorial analysis has been able to reveal closely similar patterns of underlying components among two very different sets of ratees, although at first sight the two sets of results seemed to be extremely discrepant.

Summary

1. Definitions of morale given by psychologists, and the implications of the term in everyday parlance, are very diverse. Seven-

teen qualities presumed to be connected with morale were analyzed by factorial methods in an attempt to clarify the concept.

2. Thirty persons rated fifty acquaintances (including themselves), and fifty unknown persons with whom detailed interviews had been held. The acquaintances were regarded as significantly more rational and critical than the interviewees. Most of the ratings were found to be fairly reliable.

3. Correlations between the qualities and the general factors extracted from these intercorrelations were found to be largely dissimilar in the two sets of ratings. This was due to the differences between the two groups of ratees. However, when three factors were extracted from each set and rotated according to Thurstone's technique, similar underlying patterns emerged, in spite of the poor reliability of the additional factors.

4. A factor of stability, optimism and trustfulness, cheerfulness, adaptability to hardships, and enthusiasm, was found to enter into almost all the qualities. This can be regarded as a general factor in people's conceptions of morale, which is most prominent when the raters are not well acquainted with the ratees.

5. A group factor representing a rational, liberal, and altrocentric outlook emerged from both sets of ratings, being especially marked among the ratings of acquaintances. Other group or specific factors are suggested but could only be established by a more extensive inquiry, using larger numbers of cases.

THE DESCRIPTION OF THE PSYCHOLOGICAL ENVIRONMENT IN THE WORK OF MARCEL PROUST

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Novelists who have the reputation of being good psychologists can give evidence of their knowledge of human nature in different ways. A Dostoevski amazes us by convincing descriptions of persons on or beyond the borderline of normality; others reveal to us the hidden motives of man, like vanity, egoism, and will to power; with still others psychological insight is more implicitly woven into the fiber of the story. Proust uses all these approaches in his analysis of people and social atmospheres; but he is unique in one respect, in the way in which he sifts and dissects each little event to try to describe the subjective environment of that moment. He wants to know how we perceive reality and how our subjective impressions are different from the objective world laid out in measurable time and space. His preoccupation with these questions leads him on and on in his descriptions of the French society of his day.

These problems belong to the field of perception in its broadest sense. Since this field is one which has been most thoroughly investigated by psychologists, it is not surprising that in Proust's work we find many points of contact with academic psychology. It is difficult to translate Dostoevski's insights into psychological terminology. But in Proust we find pages that seem to be written almost for the purpose of illustrating the laws that are found in psychological treatises. As the psychologist reads Proust, he is reminded especially of two somewhat related approaches to psychological problems. One is the theory of perception as gestalt psychology has elaborated it; the other is developmental psychology as it is represented in the works of Piaget and Werner. Gestalt psychology, in its experimental studies, has dealt largely with perception in the normal adult. Developmental psychology is concerned with the mental processes in the undeveloped or regressed mind; it

attempts to describe perception, thought, and emotion of children, so-called primitive people, or psychotics.

A few remarks about developmental psychology may be in place. When we want to describe the psychological environment of children, we confront it with that of more logical and objective adults who possess a high degree of "object constancy." We then find in children "syncretic" and "diffuse" perception and thought (Werner, **7**). Their world shows a lack of differentiation between ego and objects. "The intelligence does not begin with a knowledge of the ego as such and of the things as such but with one of their interaction; in orienting itself simultaneously towards the two poles of this interaction it organises the world and itself" (Piaget, **6,** p. 360). "For it is characteristic of primitive mental life that it reveals a relatively limited differentiation of object and subject, of perception and pure feeling, of idea and action, etc." (Werner, **7,** p. 59).

These conclusions are based on the observation of the behavior of animals, of children, primitives, and psychotics. There are relatively few introspective reports available to complete the picture. The reason for this lack is obvious: persons of primitive mentality are usually not capable of this "objectivity" towards their own subjectivity which introspection demands.

Only in poets or writers of fiction do we find sometimes this combination of primitivity and intellectuality; and in no work of literature is it as perfect as in Marcel Proust's *Remembrance of Things Past* which abounds in illustrations for a psychology of mental development.

That Proust has, in some respects, the mentality of a primitive has been noted by several of his critics, especially Dandieu. "The confusion between present and past, subject and object, . . . are corrected or rather completed by what the sociologists call the sentiment of participation, which is the key to all magic operations and also the origin of Proust's metaphore" (Dandieu, **2,** p. 48; cf. Ellis, **3**).

In the following a few quotations are collected which show how Proust's descriptions of the psychological environment illustrate the analyses of gestalt psychology and developmental psychology.[1] But we do not attempt, of course, to give a complete picture of the psychology of Proust's personality, or of the many psychological insights which are contained in his writings.

[1] See the list of references (p. 314) for the abbreviations used in referring to Proust's work.

Region, Whole Situation

When we examine the way in which Proust describes the properties of the psychological environment we find, first of all, that he is aware of the role greater units, regions,[2] and whole situations play. He describes these units very convincingly when he talks of the two regions of the "Guermantes way" and the "Méséglise way":

> Since my father used always to speak of the "Méséglise way" as comprising the finest view of a plain that he knew anywhere, and of the "Guermantes way" as typical of river scenery, I had invested each of them, by conceiving them in this way as two distinct entities, with that cohesion, that unity which belongs only to the figments of the mind; the smallest detail of either of them appeared to me as a precious thing, which exhibited the special excellence of the whole. . . . But, above all, I set between them, far more distinctly than the mere distance in miles and yards and inches which separated one from the other, the distance that there was between the two parts of my brain in which I used to think of them, one of those distances of the mind which time serves only to lengthen, which separate things irremediably from one another, keeping them for ever upon different planes. And this distinction was rendered still more absolute because the habit we had of never going both ways on the same day, or in the course of the same walk, but the "Méséglise way" one time and the "Guermantes way" another, shut them up, so to speak, far apart and unaware of each other's existence, in the sealed vessels—between which there could be no communication—of separate afternoons. (SwW, pp. 172 f.)

The view of Bergson or James, namely, that our consciousness consists of a continuous stream of ever changing happenings, is not held by Proust. This becomes especially evident when he describes a change from one whole situation to another. Then we are likely to become aware of the existence of regions in our psychological environment, and of their sometimes sharply defined boundaries:

> [Approaching home after a happy walk,] I would know that in half an hour we should be at home, and that there . . . I should be sent to bed as soon as I had swallowed my soup, so that my mother . . . would not come upstairs to say good night to me in bed. The zone of melancholy which I then entered was totally distinct from that other zone, in which I had been bounding for joy a moment earlier, just as sometimes in the sky a band of pink is separated, as though by a line invisibly ruled, from a band of green or black. You may see a bird flying across the pink; it draws near the border-line, touches it, enters and is lost upon the black.

[2] The terms "psychological environment" and "region" are not used in a narrow perceptual sense. In regard to the concept of psychological environment cf. Koffka (**4**, pp. 27 ff.), and Lewin (**5**, pp. 18 f.). Lewin, whose usage of the term *region* we follow, gives, among others, these examples for it: "region of a forest; a region within which one may be seen from a certain point; . . . the sphere of influence of a person; a social group; an occupation . . ." (Lewin, **5**, p. 94).

The longings by which I had just now been absorbed, to go to Guermantes, to travel, to live a life of happiness—I was now so remote from them that their fulfillment would have afforded me no pleasure. How readily would I have sacrificed them all, just to be able to cry, all night long, in the arms of Mamma! . . . and this state would persist until the morrow, when . . . I would leap out of bed to run down at once into the garden, with no thought of the fact that evening must return, and with it the hour when I must leave my mother. And so it was from the "Guermantes way" that I learned to distinguish between these states which reigned alternately in my mind, during certain periods, going so far as to divide every day between them, each one returning to dispossess the other with the regularity of a fever and ague: contiguous, and yet so foreign to one another, so devoid of means of communication, that I could no longer understand, or even picture to myself, in one state what I had desired or dreaded or even done in the other. (SwW, pp. 235 f.)

We are reminded by this description of topological psychology (Lewin, **5**) in which terms like "region" ("zone" is used by Proust as equivalent to "region"), "sharpness of boundaries," "communication," etc., play a basic role. We may note at the same time that Proust uses both concepts which are, in topological psychology, fundamental for the determination of relationships between regions; that of locomotion ("entering the zone of melancholy," the analogy of the flying bird), and that of communication ("the sealed vessels—between which there could be no communication," "devoid of means of communication").

The effect of these regions on the behavior is especially noticeable with persons of primitive mentality whose life space is less object-adequate.

The fact that the primitive world may be built up out of different spheres, each of which is a self-contained unity, is of special importance for developmental psychology. These diverse spheres are determined by different drive patterns among which there is little intercommunicability. One sphere succeeds the other like scenes on a revolving stage . . . since an object is reacted to according to its attachment to a certain sphere, it is to be assumed that the meaning of the "same" object changes from sphere to sphere. Only when . . . things can be grasped on the basis of different distinct aspects . . . is it possible to have an identity and constancy of things. (Werner, **7**, p. 381.)

We also want to call the attention to another point in Proust's observation, namely, the fact that the forces and goals (desires, wishes, "drive patterns" in the quotation from Werner) may change with a change of region.

That the parts of a region exhibit the quality of the whole is also expressed clearly by Proust ("the smallest detail of either of them

appeared to me as a precious thing, which exhibited the special excellence of the whole"). Gestalt psychological experiments with abstract forms have proved that the appearance of the parts often depends on the characteristics of the whole. Werner points out that this dependence of the part on the whole is more pronounced in primitive perception. Object-constant perception presupposes independence, to a certain degree, of the appearance of the object from the setting. "The embedding of things in the concrete situation demonstrates clearly what is meant by a relatively global, or diffuse, type of organization" (Werner, **7**, p. 135). "In this diffusely organized, homogeneous perception it is fundamental that each constituent part contain some of the quality-of-the-whole, and that these parts be instinct with the situative meaning, the broader meaning of the totality" (Werner, **7**, p. 113).

In many places Proust explicitly describes the influence of embeddedness. A case which is taken from more peripheral perception and in which a veritable optical illusion resulted is the following:

> Her black eyes gleamed, and as I did not at that time know, and indeed have never since learned how to reduce to its objective elements any strong impression, since I had not, as they say, enough "power of observation" to isolate the sense of their colour, for a long time afterwards, whenever I thought of her, the memory of those bright eyes would at once present itself to me as a vivid azure, since her complexion was fair; so much so that, perhaps, if her eyes had not been quite so black—which was what struck one most forcibly on first meeting her—I should not have been, as I was, especially enamoured of their imagined blue. (SwW, p. 180.)

The influence of embeddedness in a setting is apparent also in the following example:

> Every few minutes the little train brought us to a standstill in one of the stations which came before Balbec-Plage, stations the mere names of which . . . seemed to me outlandish, whereas if I had come upon them in a book I should at once have been struck by their affinity to the names of certain places in the neighborhood of Cambray. But to the trained ear two musical airs, consisting each of so many notes, several of which are common to them both, will present no similarity whatever if they differ in the colour of their harmony and orchestration. So it was that nothing could have reminded me less than these dreary names, made up of sand, of space too airy and empty and of salt, out of which the termination "ville" always escaped, as the "fly" seems to spring out from the end of the word "butterfly"—nothing could have reminded me less of those other names . . . which, because I had heard them pronounced so often by my great-aunt at table, in the dining-room, had acquired a certain sombre charm in which were blended perhaps extracts of the flavour of "preserves," the smell of the fire of logs and of the pages of one of Bergotte's books, the colour of the

stony front of the house opposite, all of which things still to-day when they rise like a gaseous bubble from the depth of my memory preserve their own specific virtue through all the successive layers of rival interests which must be traversed before they reach the surface. (BGr I, pp. 335 f.)

Proust shows in this description that he is fully aware of the fact that recognition failed to occur because the place-names were imbued with the whole quality of the old setting. "A trace strongly 'embedded' in a trace system is less available for a new process than a trace loosely embedded" (Koffka, **4,** p. 623).

We add a few quotations which show how the home in which a beloved person lives, the things with which she is connected form a region which stands out significantly from its background. The quality and the value which are attributed to the object of love, and even the history of that love give this region its specific coloring. These passages illustrate the fact that the needs of the person are factors in the organization of the life space into regions, and that needs can be responsible for figure-background relationships:

My imagination had isolated and consecrated in the social Paris a certain family, just as it had set apart in the structural Paris a certain house, on whose porch it had fashioned sculptures and made its windows precious. . . . Just as my father and mother looked upon the house in which Swann lived as one that closely resembled the other houses built at the same period in the neighborhood of the Bois, so Swann's family seemed to them to be in the same category as many other families of stockbrokers . . . in order to distinguish in all Gilberte's surroundings, an indefinable quality analogous, in the scale of emotions, to what in the scale of colours is called infra-red, a supplementary sense of perception was required, with which love, for the time being, had endowed me; and this my parents lacked. (SwW, pp. 536 f.)

All the ideas that I had formed of the hours, different from those that exist for other men, passed by the Swanns in that house which was to their life what the body is to the soul, and must give expression to its singularity, all those ideas were rearranged, amalgamated—equally disturbing and indefinite throughout—in the arrangement of the furniture, the thickness of the carpets, the position of the windows, the ministrations of the servants. When, after luncheon, we went in the sunshine to drink our coffee in the great bay window of the drawing-room, while Mme. Swann was asking me how many lumps of sugar I took, it was not only the silk-covered stool which she pushed towards me that emitted, with the agonising charm that I had long ago felt—first among the pink hawthorn and then beside the clump of laurels—in the name of Gilberte, the hostility that her parents had shewn me, which this little piece of furniture seemed to have so well understood, to have so completely shared that I felt myself un-

worthy, and found myself almost reluctant to set my feet on its defenceless cushion. . . . (BGr I, pp. 158 f.)[3]

Resuscitation of Situations

That a situation with all its original forces can be reinstated after a long interval during which other situations were potent is shown by what Proust calls "intermissions of the heart." The narrator of the novels had always loved his grandmother dearly, but it was during a visit to Balbec, when he spent a vacation alone with her, that he had been most dependent on her. She died when they were in Paris again. The realization of what her death meant came to him only a whole year later when he was again in Balbec and when the situation of the previous summer was reinstated.

. . . if the setting of sensations in which they [our joys and sorrows] are preserved be recaptured, they acquire in turn the same power of expelling everything that is incompatible with them, of installing alone in us the self that originally lived them. Now, inasmuch as the self that I had just suddenly become once again had not existed since that evening long ago when my grandmother undressed me after my arrival at Balbec, it was quite naturally, not at the end of the day that had just passed, of which that self knew nothing, but—as though there were in time different and parallel series—without loss of continuity, immediately after the first evening at Balbec long ago, that I clung to the minute in which my grandmother had leaned over me. The self that I then was, that had so long disappeared, was once again so close to me that I seemed still to hear the words that had just been spoken, albeit they were nothing more now than illusion, as a man who is half awake thinks he can still make out close at hand the sounds of his receding dream. I was nothing now but the person who sought a refuge in his grandmother's arms, sought to wipe away the traces of his suffering by giving her kisses, that person whom I should have had as great difficulty in imagining when I was one or other of those persons which, for some time past, I had successively been, as the efforts, doomed in any event to sterility, that I should now have had to make to feel the desires and joys of any of those which, for a time at least I no longer was. (CPl I, pp. 218 ff.; cf. also SwCh, pp. 176 f., GW I, p. 104.)

[3] The following passages are also relevant to the topic of this section. In regard to the concept of psychological environment in general: Capt, p. 255, SwCh, p. 217. In regard to regions: SwW, pp. 400 f. (social regions in Swann's life), GW I, p. 31 (psychological boundary), SwCh, pp. 187 f. (zones of substitute satisfaction). Closely related are the cases where he speaks of different "selves" instead of regions: BGr II, p. 346, SwCh, pp. 17 ff. For descriptions of physiognomic characters: BGr II, p. 342 (faces), GW I, p. 103 (landscape), GW I, p. 69 (clothes). Needs as factors in the organization of the environment: BGr I, p. 141 (region of loved person), BGr II, p. 348 (face), GW II, pp. 55 and 102 f. (time). Embeddedness: GW I, pp. 4 f. (names), GW II, p. 123 (landscape).

In this situation the reinstatement of the old situation was produced by the environment which was, with the exception of the absence of the grandmother, more or less the same as that of the original situation. In other cases situations are revived by a mere fragment of the original environment, and these play a central role in Proust's work.[4] The savour of a small cake (the famous *madeleine*), the sound of a spoon striking against a plate, the stepping on uneven flagstones, the starchy stiffness in a napkin, give rise to the experience of whole situations in which these fragments played a part.

. . . in stepping back, [I] struck my foot against some unevenly cut flagstones leading to a carriage house . . . immediately all my discouragement vanished before a feeling of happiness. . . . A deep azure blue intoxicated my sight, impressions of coolness and dazzling light hovered near me and, in my eagerness to seize them, not daring to move—just as when I tasted the flavour of the *madeleine* and tried to bring back to my mind what it suggested to me—I stood there, swaying back and forth, as I had done a moment before, one foot on the higher stone and the other on the lower, indifferent to the possible amusement of the large crowd of chauffeurs. Each time that I merely repeated the action physically, the effort was in vain; but if I forgot the Guermantes reception and succeeded in recapturing the sensation I had felt the instant I placed my feet in that position, again the dazzling, elusive vision brushed me with its wings . . . almost immediately I recognized it; it was Venice . . . which was brought back to me by the sensation I had once felt as I stood on two uneven flagstones in the baptistry of Saint Mark's, and with that sensation came all the others connected with it that day, which had been waiting in their proper place in the series of forgotten days, until a sudden happening had imperiously commanded them to come forth. It was in the same way that the taste of the little *madeleine* had recalled Cambray to my mind. (PR, pp. 191 f.)

What happened was that a servant, trying in vain to make no noise, struck a spoon against a plate. The same kind of felicity as I had received from the uneven paving stones now came over me; the sensations were again those of great heat, but entirely different, mingled with the odour of smoke, tempered by the cool fragrance of a forest setting, and I recognized that what seemed to me so delightful was the very row of trees . . . which, in a sort of hallucination, I thought now stood before me. . . . I wiped my mouth with the napkin . . . immediately . . . a fresh vision of azure blue passed before my eyes; but this time it was pure and saline and it rounded upward like bluish breasts. The impression was so vivid that the moment I was reliving fused with the real present and . . . I

[4] Proust's ideas of the involuntary memory play an important part in his own thinking about these phenomena. To discuss these would be beyond the scope of this paper; cf. Blondel (1).

thought the servant had just opened the window toward the beach and everything called me to go down and stroll along the embankment at high tide; the napkin which I had taken to wipe my mouth had precisely the same sort of starchy stiffness as the towel with which I had had so much trouble drying myself before the window the first day of my stay at Balbec. . . . (PR, pp. 192 f.)

In the next quotation, the noise of a hot-water pipe reminds him of "blasts we sometimes heard of a summer evening from pleasure boats of Balbec."

. . . it was not merely an echo or a duplication of a past sensation which the sound of the hot-water pipe had just made me experience, but that very sensation itself. In that case, as in all the preceding ones, the sensation common to both occasions had sought to re-create about itself the former setting, while the present setting, which was occupying its space, opposed with all the resistance of its mass this invasion of a Paris residence by a Normandy beach or a railway embankment. The dining-room by the sea at Balbec . . . had sought to shatter the solidity of the Guermantes mansion and force open its doors, and it had for an instant made the sofas rock about me. . . . Always, in these resurrections of the past, the distant place, evoked about the common sensation, had grappled for a moment, like a wrestler, with the present scene. (PR, p. 200.)

It seems to us that the passages taken from Proust support Werner's analysis rather than an interpretation based on associationistic principles. Werner explains the arousal of whole-situations from a fragmentary part with children by the diffuse character of the child's experience of the situations. "The common, global significance of a situation in which any part may represent the whole . . . acted again to occasion an identical reaction in a similar version. It is because of this that a child often tries to complete a situation on the basis of a fragmentary part which, for the adult, might not necessarily show any relation at all to the whole, but which, for the child, may be shot through with the same coloration as the previously experienced total situation." (Werner, **7,** p. 114).

It is always the "coloration," the physiognomic quality of the total situation which is first aroused ("impressions of coolness and dazzling light," "sensations of great heat mingled with the odour of smoke, tempered by the cool fragrance of a forest setting," "azure blue—rounded upward like bluish breasts." Only further search discloses the more objective properties of the original situation.

Another interesting feature of these experiences is their hallucinatory character. It reveals that the differentiation into ego and

environment is not fully developed and that the boundary between them is not laid out in the same way as with a more "objective" person. "Everywhere in primitive society we find that visionary appearances not only are accorded an objective value, but are also invested with a superior significance, in that they may even supersede the common reality of life from day to day" (Werner, **7,** p. 146). For Proust these visionary remembrances are certainly "invested with superior significance." In the first sixty pages of the second part of *Past Recaptured* he explains how his whole philosophy of life and art and his attitude to reality is based on them.

Framework

A special case of the influence of wholes is that of their spatial and temporal framework which is described by Proust in several places. This framework which determines where in time and space we "are" phenomenally and dynamically is (cf. Koffka **4,** chap. v-vii), although it has far reaching psychological effects, often not manifest; probably because it corresponds so often to the measurable reality. Proust catches it at the one moment where in everyday life its reality is most easily observed, at the moment of awakening in an unusual situation, which has disturbed the smooth working of the framework mechanism.

> When a man is asleep, he has in a circle around him the chain of the hours, the sequence of the years, the order of the heavenly host. Instinctively, when he awakes, he looks to these, and in an instant reads off his own position on the earth's surface and the amount of time that has elapsed during his slumbers; but this ordered procession is apt to grow confused, and to break its ranks. Suppose that, towards morning, after a night of insomnia, sleep descends upon him while he is reading, in quite a different position from that in which he normally goes to sleep, he has only to lift his arm to arrest the sun and turn it back in its course, and, at the moment of waking, he will have no idea of the time, but will conclude that he has just gone to bed. Or suppose that he gets drowsy in some even more abnormal position; sitting in an armchair, say, after dinner: then the world will fall topsy-turvy from its orbit, the magic chair will carry him at full speed through time and space, and when he opens his eyes again he will imagine that he went to sleep months earlier and in some far distant country. But for me it was enough if, in my own bed, my sleep was so heavy as completely to relax my consciousness; for then I lost all sense of the place in which I had gone to sleep, and when I awoke at midnight, not knowing where I was, I could not be sure at first who I was; I had only the most rudimentary sense of existence, such as may lurk and flicker in the depth of an animal's consciousness; I was more destitute of human qualities than the cave-dweller; but then the memory, not yet of the

place in which I was, but of various other places where I had lived, and might now very possibly be, would come like a rope let down from heaven to draw me up out of the abyss of not-being, from which I could never have escaped by myself: in a flash I would traverse and surmount centuries of civilization, and out of a half-visualised succession of oil-lamps, followed by shirts with turned-down collars, would put together by degrees the component parts of my ego. (SwW, pp. 3 f.; cf. also: GW I, p. 112, CPl II, p. 175.)

In this description the role of the framework in the constitution of the ego is stressed. In the following paragraphs we find an observation of a reorganization of the framework; it had been, from memory, erroneously constructed and was set right as soon as an outside stimulus affected the organization.

It is true that, when morning drew near, I would long have settled the brief uncertainty of my waking dream, I would know in what room I was actually lying, would have reconstructed it round about me in the darkness, and—fixing my orientation by memory alone, or with the assistance of a feeble glimmer of light at the foot of which I placed the curtains and the window—would have reconstructed it complete and with its furniture, as an architect and an upholsterer might do, working upon an original, discarded plan of the doors and windows; would have replaced the mirrors and set the chest-of-drawers on its accustomed site. But scarcely had daylight itself—and no longer the gleam from a last, dying ember on a brass curtain-rod, which I had mistaken for daylight—traced across the darkness, as with a stroke of chalk across a blackboard, its first white correcting ray, when the window, with its curtains, would leave the frame of the doorway, in which I had erroneously placed it, while, to make room for it, the writing-table, which my memory had clumsily fixed where the window ought to be, would hurry off at full speed, thrusting before it the mantelpiece, and sweeping aside the wall of the passage; the well of the courtyard would be enthroned on the spot where, a moment earlier, my dressing-room had lain, and the dwelling-place which I had built up for myself in the darkness would have gone to join all those other dwellings of which I had caught glimpses from the whirlpool of awakening; put to flight by that pale sign traced above my window-curtains by the uplifted forefinger of day. (SwW, pp. 240 f.)

Aspects

We shall now quote a few examples in which it is the history of the approach or the mediation which determines the appearance of an object. This case shows effects similar to those of embeddedness in a whole situation. One and the same object, when embedded in two different whole situations, can appear as two different objects; similarly, one and the same object, perceived from two different sides, can appear as two different objects. This happens

when the aspects are not considered only in their role as mediators of objects; in other words, when the aspect, which includes a relationship between person and real object, is interpreted as a property of the object. When an object is given us in two different aspects we often hardly recognize it as the same; or, when it is recognized, we are confronted by the problem of two things being the same and not the same. Usually we are not aware that objects are given to us only in certain aspects. However, when two aspects of the same object conflict, we realize the fact that the appearance of objects can depend, among other things, on the history of our approach and on the particular circumstances of mediation.

Proust's ideas about the role which aspects play in our perception find their most articulate expression when he deals with the "perception" of personalities. Often, in order to demonstrate the general validity of his observations, he takes analogies from the field of visual perspective, where the influence of the point of view on the appearance of objects is most obvious:

> The good and bad qualities which a person presents to us, exposed to view on the surface of his or her face, rearrange themselves in a totally different order if we approach them from another angle—just as, in a town, buildings that appear strung irregularly along a single line, from another aspect retire into a graduated distance, and their relative heights are altered. (BGr II, p. 241.)

> Apart from the most recent applications of the art of photography—which set crouching at the foot of a cathedral all the houses which, time and again, when we stood near them, have appeared to us to reach almost to the height of the towers . . . bring into actual contact the two columns on the Piazetta which a moment ago were so far apart, thrust away the adjoining dome of the Salute, . . . I can think of nothing that can so effectively as a kiss evoke from what we believe to be a thing with one definite aspect, the hundred other things which it may equally well be since each is related to a view of it no less legitimate. In short, just as at Balbec Albertine had often appeared to me different, so now, as if, wildly accelerating the speed of the changes of aspect and changes of colouring which a person presents to us in the course of our various encounters, I had sought to contain them all in a space of a few seconds so as to reproduce experimentally the phenomenon which diversifies the individuality of a fellow creature, and to draw out one from another, like a nest of boxes, all the possibilities that it contains, in this brief passage of my lips towards her cheek it was ten Albertines that I saw; this single girl being like a goddess with several heads, that which I had last seen, if I tried to approach it, gave place to another. (GW II, pp. 76 f.)

How the picture of a person must be reorganized when a new aspect has to be integrated into our concept of a personality is shown

in the description of the scene in which the narrator learns that M. de Charlus is homosexual:

From the beginning of this scene a revolution, in my unsealed eyes, had occurred in M. de Charlus, as complete, as immediate as if he had been touched by a magician's wand. . . . Those of my readers who do not care to refer, for examples of this law, to the Messieurs de Charlus of their acquaintance, whom for long years they had never suspected, until the day when, upon the smooth surface of the individual just like everyone else, there suddenly appeared, traced in an ink hitherto invisible, the characters that compose the word dear to the ancient Greeks, have . . . only to remind themselves how many times . . . they have found themselves on the point of making a blunder. Nothing upon the blank, undocumented face of this man or that could have led them to suppose that he was precisely the brother, or the intended husband, or the lover of a woman of whom they were just going to remark: "What a cow!" But then, fortunately, a word whispered to them by someone standing near arrests the fatal expression on their lips. At once there appear, like a *Mene, Tekel, Upharsin,* the words: "He is engaged to," or, "he is the brother of," or, "he is the lover of the woman whom we ought not to describe, in his hearing, as a cow." And this one new conception will bring about an entire regrouping, thrusting some back, others forward, of the fractional conceptions, henceforward a complete whole, which we possessed of the rest of the family. In M. de Charlus another creature might indeed have coupled itself with him which made him as different from other men as the horse makes the centaur, this creature might indeed have incorporated itself in the Baron, I had never caught a glimpse of it. Now the abstraction had become materialised, the creature at last discerned had lost its power of remaining invisible, and the transformation of M. de Charlus into a new person was so complete that not only the contrasts of his face, of his voice, but, in retrospect, the very ups and downs of his relations with myself, everything that hitherto had seemed to my mind incoherent, became intelligible, brought itself into evidence, just as a sentence which presents no meaning so long as it remains broken up in letters scattered at random upon a table, expresses, if these letters be rearranged in the proper order, a thought which one can never afterwards forget. (CPl I, pp. 18 ff.)

In the next example we see how conflicting aspects can make us skeptical of our ability ever to approach the reality of a person through its aspects. It is essentially the case of Locke's temperature illusion: the same water, when approached under different conditions, appears different. We derive from such situations arguments for the subjectivity of aspects.

When Françoise, in the evening, was polite to me, and asked my permission before sitting down in my room, it seemed as though her face became transparent and I could see the goodness and honesty that lay beneath. But Jupien . . . revealed afterwards that she had told him

that I was not worth the price of a rope to hang me, and that I had tried to insult her in every possible way. These words of Jupien set up at once before my eyes, in new and strange colours, a print of the picture of my relations with Françoise so different from that on which I used to like letting my eyes rest, and in which, without the least possibility of doubt, Françoise adored me and lost no opportunity of singing my praises, that I realised that it is not only the material world that is different from the aspect in which we see it; that all reality is perhaps equally dissimilar from what we think ourselves to be directly perceiving; that the trees, the sun and the sky would not be the same as what we see if they were apprehended by creatures having eyes differently constituted from ours, or, better still, endowed for that purpose with organs other than eyes which would furnish trees and sky and sun with equivalents, though not visual. However that might be, this sudden outlet which Jupien threw open for me upon the real world appalled me. So far it was only Françoise that was revealed, and of her I barely thought. Was it the same with all one's social relations? And in what depths of despair might this not some day plunge me, if it were the same with love? . . . At any rate I realised the impossibility of obtaining any direct and certain knowledge of whether Françoise loved or lothed me. And thus it was she who first gave me the idea that a person does not (as I had imagined) stand motionless and clear before our eyes with his merits, his defects, his plans, his intentions with regard to ourself exposed on his surface, like a garden at which . . . we gaze through a railing, but is a shadow which we can never succeed in penetrating, of which there can be no such thing as direct knowledge, with respect to which we form countless beliefs, based upon his words and sometimes upon his actions, though neither words nor actions can give us anything but inadequate and as it proves contradictory information—a shadow behind which we can alternately imagine, with equal justification, that there burns the flame of hatred and of love. (GW I, pp. 82 ff.)

That one and the same person can be seen by different people from different points of view is also discussed in the description of Swann's personality. The role Swann plays in the eyes of the narrator's relatives differs widely from that which he plays in the aristocratic circles of Paris. (SwW, pp. 19 ff.) Certainly we find many works of other writers in which aspects or the "angle of vision" plays an important part. But we find hardly anywhere such detailed analysis and abstract formulations of the facts involved as we find them in Proust's work.

We may also add here a few examples of egocentricity in which the role of aspects is exemplified by the difference between the picture that we form of ourselves, our actions, and words, and that which other people form of them:

Each of our actions, our words, our attitudes is cut off from the "world," from the people who have not directly perceived it, by a medium the per-

meability of which is of infinite variation and remains unknown to ourself; . . . What we actually recall of our conduct remains unknown to our nearest neighbor; what we have forgotten that we ever said, or indeed what we never did say flies to provoke hilarity even in another planet, and the image that other people form of our actions and behaviour is no more like that which we form of them ourself, than is like an original drawing a spoiled copy in which, at one point, for a black line, we find an empty gap, and for a blank space an unaccountable contour. (GW I, pp. 373 f.)

We imagine always when we speak that it is our own ears, our own mind that are listening. (BGr I, p. 264.)

That our words are, as a general rule, filled, by the person to whom we address them, with a meaning which that person derives from her own substance, a meaning widely different from that which we had put into the same words when we uttered them, is a fact which the daily round of life is perpetually demonstrating. (BGr II, p. 252.)

The most important application of this doctrine of aspects we find in Proust's theory of erotic fixation. At the same time this theory is illuminating in regard to his attitude towards reality. Often, the situation of the first encounter determines the role a woman plays in a man's life (Proust does not describe women in a corresponding situation). A man falls in love with a woman when he is separated from her by a great psychological distance, and when he thinks, erroneously or not, that the goal of his love is difficult to attain. Then he lets his imagination loose, he starts dreaming about her, and he fashions around a small core of reality a picture of his ideal. Just as in a Rorschach experiment, he projects his whole ego and attaches it to a kernel of reality. Only the fact that he knows very little about the real woman makes this possible; the "stimulus conditions" are weak.

I realised also then all that the human imagination can put behind a little scrap of face, such as this girl's face was, if it is the imagination that was the first to know it; and conversely into what wretched elements, crudely material and utterly without value, might be decomposed what had been the inspiration of countless dreams if, on the contrary, it should be so to speak controverted by the slightest actual acquaintance. I saw that what had appeared to me to be not worth twenty francs when it had been offered to me for twenty francs in the house of ill fame, where it was then for me simply a woman desirous of earning twenty francs, might be worth more than a million, more than one's family, more than all the most coveted positions in life if one had begun by imagining her to embody a strange creature, interesting to know, difficult to seize and to hold. No doubt it was the same thin and narrow face that we saw, Robert and I. But we had arrived at it by two opposite ways, between which there was no com-

munication, and we should never both see it from the same side. That face, with its stares, its smiles, the movements of its lips, I had known from outside as being simply that of a woman of the sort who for twenty francs would do anything that I asked. And so her stares, her smiles, the movements of her lips had seemed to me significant merely of the general actions of a class without any distinctive quality. And beneath them I should not have had the curiosity to look for a person. But what to me had in a sense been offered at the start, that consenting face, had been for Robert an ultimate goal towards which he had made his way through endless hopes and doubts, suspicions, dreams. He gave more than a million francs in order to have for himself, in order that there might not be offered to others what had been offered to me, as to all and sundry, for a score. That he too should not have enjoyed it at the lower price may have been due to the chance of a moment, the instant in which she who seemed ready to yield herself makes off, having perhaps an assignation elsewhere, some reason which makes her more difficult of access that day. Should the man be a sentimentalist, then, even if she has not observed it, but infinitely more if she has, the direst game begins. Unable to swallow his disappointment, to make himself forget about the woman, he starts afresh in pursuit, she flies him, until a mere smile for which he no longer ventured to hope is bought at a thousand times what should have been the price of the last, the most intimate favours. (GW I, pp. 213 f.; cf. also GW I, pp. 235 and 246.)

Variance of a belief, annulment also of love, which, pre-existent and mobile, comes to rest at the image of any one woman simply because that woman will be almost impossible of attainment. Thenceforward we think not so much of the woman of whom we find difficulty in forming an exact picture, as of the means of getting to know her. A whole series of agonies develops and is sufficient to fix our love definitely upon her who is its almost unknown object. Our love becomes immense; we never dream how small a place in it the real woman occupies. And if suddenly . . . we cease to be uneasy, to suffer pain, since it is this pain that is the whole of our love, it seems to us as though love had abruptly vanished at the moment when at length we grasp the prey to whose value we had not given enough thought before. What did I know of Albertine? One or two glimpses of a profile against the sea. . . . Since my first sight of Albertine I had meditated upon her daily, a thousandfold, I had carried on with what I called by her name an interminable unspoken dialogue in which I made her question me, answer me, think and act, and in the infinite series of imaginary Albertines who followed one after the other in my fancy, hour after hour, the real Albertine, a glimpse caught on the beach, figured only at the head, just as the actress who creates a part, the star, appears, out of a long series of performances, in the few first alone. That Albertine was scarcely more than a silhouette, all that was superimposed being of my own growth, so far when we are in love does the contribution that we ourselves make outweigh—even if we consider quantity only—those that come to us from the beloved object. And the same is true of love that is given

its full effect. There are loves that manage not only to be formed but to subsist around a very little core. . . . (BGr II, pp. 218 ff.)

It is the terrible deception of love that it begins by engaging us in play not with a woman of the external world but with a puppet fashioned and kept in our brain, the only form of her moreover that we have always at our disposal, the only one that we shall ever possess, one which the arbitrary power of memory, almost as absolute as that of imagination, may have made as different from the real woman as had been from the real Balbec the Balbec of my dreams; an artificial creation to which by degrees, and to our own hurt, we shall force the real woman into resemblance. (GW II, pp. 84 f.)

. . . a certain similarity exists . . . between all the women we love, a similarity that is due to the fixity of our own temperament. . . . They are, these women, a product of our temperament, an image inversely projected, a negative of our sensibility. . . . We understand the characters of people who do not interest us; how can we ever grasp that of a person who is an intimate part of our existence, whom after a little we no longer distinguish in any way from ourself . . . our curiosity as to the woman whom we love overleaps the bounds of that woman's character, which we might if we chose but probably will not choose to stop and examine. (BGr II, pp. 270 f.)[5]

Proust's Personality

We have seen that many of the quotations which we selected describe the functioning of a primitive mind. How can we combine this finding with the fact that Proust's intellect was extremely subtle and differentiated, and his sensitiveness oversophisticated? We cannot solve this problem; we can only state it in more explicit terms.

Two tendencies are discernible in Proust's attitude toward the world.[6] On the one hand he strives constantly to represent persons, situations, and social groups with utmost objectivity and he attempts to construct their essential core by rational means. He tries to overcome the subjectivity of perspective aspects, observes the typical traits in persons and is interested in general laws. Not only

[5] The following references are also relevant to this section. In regard to aspects of persons: SwW, pp. 525 f., BGr I, p. 28, BGr II, p. 242, CPI II, p. 230; of faces: BGr II, pp. 301 f., GW I, p. 77; of a landscape: CPI II, pp. 207 f. In regard to the egocentric image of ourselves: GW I, pp. 373 f., CPI II, p. 268. There exist also a few beautiful passages in which the interaction of traces and "stimuli conditions" is treated: SwW, p. 21, GW I, pp. 187 f. We add these references here since they are related to the subject of this section. In regard to erotic fixation and the illusory picture of the loved person, see also: BGr II, p. 243, GW I, p. 388, GW II, p. 73, CPI I, pp. 318 f., CPI II, p. 218, CPI II, p. 379.

[6] Cf. Blondel (1). We, however, do not agree with Blondel's solution of this problem.

is this tendency patent throughout his work, but he himself testifies to it.

. . . it is the feeling for the general which in the future writer automatically selects what is general and can therefore enter into a work of art. For he has listened to the others only when, however mad or foolish they were, by repeating parrot-like what people of like character say, they had thereby become the prophet-birds, the spokesmen for a psychological law. (PR, pp. 230 f.)

I was not unmoved by these last examples, as always when, beneath the particular instance, I was afforded a glimpse of the general law. (GW I, p. 154.)

Like a geometrician who, stripping things of their perceptible qualities, sees only their linear substratum, what people said escaped me because what interested me was not what they wanted to say, but the way they said it insofar as it revealed their characters or their ludicrous traits; or, rather, there was one thing which had always been the object of my investigation because it gave me a very special pleasure, and that was the point that two human beings had in common. It was only when I caught sight of this that my mind . . . suddenly took up the chase joyfully, but what it then pursued—for example, the identical recurrence of the Verdurin salon in various times and places—was located halfway down, below the range of vision, in a zone somewhat recessed. . . . It was of no use for me to go out to dinner, I did not see the guests because, when I thought I was looking at them, I was looking through them as with an X-ray. The result was that, when I came to put together all the notes I had been able to make on the guests at a dinner, the pattern of the lines I drew represented a collection of psychological generalisations in which the special interest of the guests' remarks occupied hardly any place. (PR, pp. 24 f.)

Opposed to this scientific tendency is a Bergsonian tendency in Proust. He is convinced that true reality can only be found in the sphere of subjective impressions, of the totality of experience; that is to say, only in organizations in which the ego-elements are given full scope.

Only the subjective impression, however inferior the material may seem to be and however improbable the outline, is a criterion of truth and for that reason it alone merits being apprehended by the mind, for it alone is able . . . to lead the mind to a greater perfection and impart to it a pure joy. (PR, p. 207.)

Proust's difficulty to get satisfaction out of contact with objective reality is related to this attitude.

. . . I came to realise clearly that disappointment in a journey and disdisappointment in a love affair were not different in themselves but merely the different aspects assumed in varying situations by our inability to find our real selves in physical enjoyment or material activity. (PR, p. 204.)

How many times in the course of my life had I been disappointed by reality because, at the time I was observing it, my imagination, the only organ with which I could enjoy beauty, was not able to function, by virtue of the inexorable law which decrees that only that which is absent can be imagined. (PR, p. 197.)

Havelock Ellis says of Proust: "We are thus led to various manifestations of ruptured vital contact with reality, marked in Proust as well as in Rousseau, the extreme sensitiveness, the morbid susceptibility, the aptitude for suspicion . . . which made relations with friends, and sometimes even with strangers, so difficult" (Ellis, **3,** p. 431).

His theory of art is based on this attitude to reality. At the beginning of the second book of *Past Recaptured* he explains in detail how he came to the conviction that the true task of the writer is to rediscover the subjective reality "from which we live so far removed and from which we become more and more separated as the formal knowledge which we substitute for it grows in thickness and imperviousness" (p. 224).

This work of the artist . . . is exactly the reverse of the process which, during every minute that we live with our attention diverted from ourselves, is being carried on within us by pride, passion, intelligence and also by our habits, when they hide our true impressions from us by burying them under the mass of nomenclatures and practical aims which we erroneously call life. (PR, p. 225.)

We are reminded of a statement by Koffka, who, in talking about physiognomic characters, says:

We conclude that objects in the field may possess characters which can be expressed in terms neither of shape and colour nor of practical use, and which are apt to exert a powerful influence on our behavior. . . . Our preoccupation with practical use and scientifically classifiable properties has robbed our world of a good many of them. . . . On the other hand, if we can abandon our practical or scientific attitude, we become aware of more and more such characteristics. Among us the poets and artists are those who are most free from the craving for efficiency. And truly, for them the world is richer in such characters than it is for us. (**4,** p. 359.)

This attitude towards reality which results in a suppression of the segregation into ego and environment lies at the basis of the so-called primitive phenomena which abound in his work. We called this attitude Bergsonian, and, indeed, Bergson could have written the paragraphs we have quoted. Proust, however, is not at all a consistent Bergsonian.[7] Even in the description of the immediate

[7] Cf. Dandieu (**2,** p. 35 n.), and Blondell (**1,** pp. 166 ff.).

data of consciousness we can discern his scientific tendency. He is not afraid of describing his findings in general concepts and he very often uses even spatial terms.[8] And the first quotations we presented in this paper show that he did not see the "stream of consciousness" as a Heraclitean flux in Bergson's sense. He holds with modern psychology that often the sequence of phenomena is divided by sharply defined boundaries. Furthermore, a person who is totally immersed in his subjective experiences would not be able to bring out so clearly in what way they are subjective. Only by contrasting them with a differentiated environment it is possible to describe them. Most of the concepts of developmental psychology, as Piaget, Werner, and others have applied them, contain such a reference to an "objective" reality. Proust, too, can give us an adequate picture of his experiences only by comparing them with a more object-constant reality.

We cannot explain this duplicity in Proust's ego-environment relationship. But we can understand that the coexistence of these two attitudes made it possible for him to give these beautiful descriptions of diffuse and syncretic phenomena.

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Abbreviations

The following abbreviations are used in the text to refer to Proust's works.

SwW: *Swann's Way*. New York: Modern Library, 1928. Pp. xv + 551.
BGr I and II: *Within a Budding Grove*, Parts I and II. New York: Modern Library, 1925. Pp. 396 and 356.
GW I and II: *The Guermantes Way*, Parts I and II. New York: Modern Library, 1925. Pp. 428 and 395.
CPl I and II: *Cities of the Plain*, Parts I and II. New York: Modern Library, 1927. Pp. 352 and 384.
Capt: *The Captive*. New York: Albert & Charles Boni, 1929. Pp. 563.
SwCh: *The Sweet Cheat Gone*. New York: Albert & Charles Boni, 1930. Pp. 379.
PR: *The Past Recaptured*. New York: Albert & Charles Boni, 1932. Pp. 402.
The first six volumes are translated by C. K. Scott Moncrieff, the last one by F. A. Blossom.

[8] Cf. Dandieu (**2**, p. 190).

A STUDY OF PERSONAL PATTERNS IN AN INTELLECTUAL PERFORMANCE*

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The present study is concerned with personal patterns in an intellectual performance. By personal patterns we mean individual differences in a given performance which are of a qualitative rather than of a quantitative nature and which might possibly have a relation to certain other personality traits. Since in a unified whole, such as personality, no part is completely isolated and independent from others, it may be assumed that typical personal differences within one sphere, such as the sphere of intellectual performances, reflect significant differences of the personality structures. We may hope, therefore, through a consideration of personal patterns within a limited performance to obtain essential cues for the understanding of much more general personality characteristics.

We came across the problem of personal patterns of intellectual performance in the course of an investigation of the thinking of schizophrenic patients which was conducted with the help of a concept formation test (3). A second part dealing with the qualitative analysis will be published shortly. This test was invented by Ach and later modified by Saharov, but is perhaps better known by the name of Vigotsky-Test, after the Russian psychologist by whom it was much used (2). The material of the test consists of twenty-two wooden blocks varying in color, shape, and size. On each block a nonsense word is written. The subject has the task of finding the characteristic that serves as a basis for naming. This basis is provided by the combination of height and size of the top area of the blocks, so that the same nonsense word is written on all large tall blocks, another one on all large flat ones, a third one on all small tall ones, and a fourth on all small flat ones. At the beginning of the test all blocks are spread in front of the subject, in a

* Reported at the forty-eighth annual meeting of the American Psychological Association, Pennsylvania State College, Sept. 4-7, 1940.

random arrangement. The names are not visible at first, being written on the undersurface of the blocks. The subject is told that the blocks form a fourfold classification which he must try to discover. In the course of the subject's attempts to group the blocks in this way or that way, e.g., on the basis of color or shape, the blocks are turned over one by one by the examiner, and the words written on them are uncovered, until the subject finally discovers the actual basis of classification. Thus the test performance usually consists of a series of attempts at grouping which provide ample material for qualitative analysis. This test is a very sensitive instrument for determining the degree of ability for abstract logical thinking, because only subjects who possess this ability in a high degree can solve the problem through a series of logical steps in a systematic insightful way. That is why we have used this test in a study of schizophrenic patients, in order to determine the degree of impairment of thinking found in some of these patients. In the course of this study it became obvious, however, that not all individual differences in performance indicated differences in ability for logical thinking. One of our normal control groups was composed of sixty-four college graduates of both sexes. About one half of them were graduate students; the other half, research workers and academic teachers. Practically all members of this group were found to possess a fully developed ability for logical procedure, and to perform the task in a perfectly adequate way; they all showed a clear understanding of the problem of classification, made correct deductions from the clues offered by the turned blocks, proceeded logically, and arrived at an insightful solution. Yet, with regard to the methods used in obtaining this solution, we found considerable individual differences between these subjects.

The subjects may be roughly subdivided into two groups: those who, in their approach to the task, show a predominance of *thinking,* and those in whose approach the *perceptual* or situational factors seem to predominate. These terms are not very adequate, but a description of the subjects' behavior may clarify the difference between the two groups.

Let us look at the procedure of a typical subject of the first group. He may first count the colors of the blocks spread in front of him, and, since there are five colors, he discards color as a possible basis of a fourfold classification. Then he places the blocks in four groups according to their shape, but the examiner, by turning some of them and showing that blocks of the same shape have different

names, proves this hypothesis to be wrong. The subject then tries height as a basis for grouping and, discovering that the blocks are of two heights only, decides that the flat and the tall blocks will have to be further subdivided according to some other characteristic. He then embarks on a search for such characteristic, and tries in succession to subdivide the two groups into complete and incomplete shapes (e.g., circles and half circles), in rectilinear and curved figures, in symmetric and asymmetric ones. After all these attempts have failed, he conceives the idea of size, and carefully compares the top areas of blocks whose names have already been uncovered. Finding that blocks of the same name actually have approximately equal sizes, he is satisfied and declares that the classification in question is based on a combination of height and size.

This record shows most of the characteristics of the approach based predominantly on thinking. The subject formulates his hypotheses in thinking without paying much attention to the blocks. Some extremists go so far in this detachment from the material with which they have to deal that they propose to start by first listing on paper "all characteristics that objects may have." Only after the hypothesis has been formulated, the subjects turn their attention to the blocks in order to check whether the material yields to the classification they have in mind. Typically these subjects check, without actually grouping the blocks—e.g., by merely counting the colors present. The handling and moving of blocks is reduced to a minimum in this type of approach, and the detached thinking predominates.

It is interesting to note that subjects of this type frequently show a strong preference for shape as a basis for grouping. Thus, the subject whose procedure we described before, after the division of blocks into circles, triangles, squares, etc. has failed, tried to divide the figures into straight and curved, or into symmetrical and asymmetrical ones. As a result of their preferences for shape, the subjects are frequently disappointed with the correct solution when they have found it. They declare that, whereas shape is an essential characteristic of an object, size is not, and feel that the required classification is artificial and stupid. On the other hand, some of them propose classifications that would appear highly artificial to others. Thus, one subject, in subdividing a group of blocks in two subgroups, isolated the one circular block, designating all the rest simply as noncircles.

In striking contrast to this type of procedure, the subject who

uses the perceptual approach to the problem, keeps in constant close touch with the material, gets ideas from looking at blocks and handling them, and in extreme cases actually has the blocks grouped before the principle involved in this grouping is clearly formulated in his mind. In trying to report, in retrospect, how he arrived at the solution, such a subject may have no more to say than that it seemed natural to group blocks in this way, that the groups "just looked right" to him. The immediate, primary character of the process of grouping is shown clearly by the following example. The subject noticed two small blocks that happened to lie close to each other, started adding other small blocks to them, all the while saying in an astonished tone of voice: "I really do not know why, but I just feel like putting this one with them, and this one, and this one." Only after she had grouped all blocks correctly, she said, as if discovering something: "Oh, I see. Of course it is size!" This sequence of events—grouping first and formulating the principle after, or at least during, the process—is typical of the approach that is guided by perception, and so is also a certain feeling of passivity described by the subjects.

As a basis for grouping, the subjects using the perceptual approach seem to favor color and size of blocks. Consequently, they are very much satisfied with the required solution: the grouping according to combined size and height looks to them harmonious, "just right." "The moment I saw it," says one subject, "this grouping was immediately plausible to me." How strong was the perceptual or even physiognomic appeal of these groups can be seen from the description of these groups given by one subject who spoke of "the powerful, uncouth blocks," "the thin sprawled ones," "the short, sturdy fellows," and "the petite, cute ones."

Which of the two approaches is the more efficient one for solving the problem? In order to answer this question we subdivided our whole group of sixty-four subjects into the two subgroups described above: those who used the predominantly perceptual and those who used the predominantly conceptual approach[1] in their attack on the task. The decision in each case was made not on the basis of any one criterion, but was based on the total impression the examiner obtained from the study of the detailed record of the subject's performance. After this, the performance of each subject was scored objectively, in terms of time and help required for the solution, and average scores were computed for the two groups

[1] In the following discussions we shall use the term "conceptual approach" as equivalent to "approach based predominantly on thinking."

separately. The results are presented in Table 1. In reading this table one must keep in mind that in our scoring system the higher score stands for poorer performance, i.e., one requiring more time and help, and vice versa.[2]

TABLE 1

	N	Time-Help Score Average	t	p
Perceptual approach	36	23	3.66	$< .01$
Conceptual approach	28	40		

We find that, on the average, the group using the perceptual approach has a great advantage over the group using the conceptual one: it reaches the correct solution in about one half of the time used in the conceptual group. The difference is statistically highly significant, as tested by Fisher's *t*-test. This finding, however, should not be interpreted as meaning that the perceptual approach is *in general* the more efficient one. The observations presented above seem to indicate that different qualities of objects lend themselves more easily to one or the other type of procedure. In our test, subjects who used the perceptual approach favored grouping according to size; and since the required classification was actually based on size, they would be the ones to find the solution quickly. Should some other feature of the blocks, such as shape, be made the basis of the required grouping, the advantage might be on the side of the conceptual group. Which of the two approaches is the more efficient one depends most likely on the nature of the task to which it is to be applied.

The conceptual and perceptual approaches as such are, however, not the only factors determining the efficiency of performance in the concept formation test. Even more important than the prevalence of thinking or of close contact with the material is the relationship of these two processes, that is, whether they work in the same direction, or against each other, whether the one supports or suppresses the other one. These two patterns of relationship between the conceptual and the perceptual processes are clearly distinguishable in the performance of the subjects. We shall call them, for want of better terms, the *concordant* and the *discordant* patterns of performance.

In descriptions of the perceptual and of the conceptual approach given above, we used cases of concordant performance as examples for both. When, in such performance, thinking leads the way, the

[2] The administration and the scoring of the test are described in detail in previous publications (**2, 3**).

subject turns to the blocks for verification of his hypotheses, and, if the material does not bear them out, quickly discards them. When, on the other hand, the perceptual factors are prevalent, the intuitive grouping of blocks is immediately followed by a conscious formulation of the principle involved. In both cases the two factors work together harmoniously. In cases of discordant performance, the picture is completely different. The subject seems to be torn between conflicting tendencies. His desire to solve the task by thinking often leads to a complete rejection of the help that he might have had from observing the properties of the material. For example, the fact that the blocks were of two heights, could be discovered most readily in the process of handling and grouping the blocks, yet some subjects refused even to touch a block until they had a solution all worked out in their mind. Most frequently, however, the subject was not completely successful in his attempts to suppress the perceptual tendencies: they were still obvious in his performance, but worked at cross-purposes with his conscious intentions. The subject may, for example, consciously entertain the idea of classification according to shape, and yet be strongly influenced by size in his actual groupings. He may, in fact, reach the correct solution based on size and still maintain that his grouping is determined by shape. Or he may be conscious of yielding to perceptual tendencies and struggle against them in a bewildered fashion. One subject said, for instance, while grouping the blocks: "I do not know why I am doing this. It is perfectly stupid. I should be thinking. There must be a logical way to solve it." As a result of all this conflict, the test performance of the subjects lacks continuity, and in extreme cases becomes completely disintegrated. On the subjective side, such a performance is characterized by feelings of confusion and distrust: distrust towards the perceptual tendencies, towards one's own ability, towards the examiner, towards the task, which is denounced as stupid or insolvable. One subject declared that he would base his grouping on dissimilarity rather than on similarity of blocks, since the examiner seemed to be against every sensible grouping. Many of these subjects became quite emotional in the course of the experiment.

With regard to the efficiency of performance the concordant group might be expected to be superior to the discordant one. Here again we have subdivided the total group by inspection of the subjects' record into the two subgroups and have then computed the average time-help scores for the concordant and the discordant

group. The results are given in Table 2. They fully justify our expectations.

TABLE 2

	N	Time-Help Score Average	t	p
Concordant performance	37	20	>5	$<.01$
Discordant performance	27	44		

The difference in time-help scores between these groups is even greater than that between the perceptual and conceptual group, and is statistically highly significant. In the case of concordance-discordance patterns, it might be assumed that the difference in efficiency is not limited to the task at hand; it seems likely that for a wide range of both practical and theoretical problems, a concordant relationship between thinking and thorough observation of the material will produce a quick and efficient solution.

In considering the relationship between the two pairs of patterns described, we find that the concordant pattern of performance is slightly prevalent in both conceptual and perceptual groups: 17 out of 28 show it in the conceptual group, and 20 out of 36 in the perceptual one. Thus the division of performances into concordant and discordant ones cuts through the division into the prevalently conceptual and the prevalently perceptual approach; there is no correlation between the two factors.

Next the following question arises: To what extent are the described patterns constant and typical for a given person? We cannot attempt to answer this question by giving the test repeatedly, because the solution once found in an insightful way is remembered by the subject more or less permanently. Furthermore, the subject's type of procedure might possibly be determined by factors specific to this particular test. It is more than likely, for example, that the cumulative effect of repeated failure to solve a problem that looks so simple, produced in some subjects an emotional tension which in turn led to the discordance of performance.[3] In order to generalize our results we should, therefore, make an attempt to relate our findings to findings made with the help of some other methods. A first beginning has been made with the Rorschach Test. This test seemed most promising for our purpose because it gives information about a rich variety of both intellectual and emotional characteristics and their relationship within the given personality structure. Among the Rorschach scores, there is one that

[3] This feature of the test is so outstanding that the test situation can actually be used as a frustration experiment (1).

would seem to have much in common with what we described as perceptual or conceptual approach to a problem. This is the so-called Apperception Type, or Mode of Approach, which is derived from the distribution of the subject's responses to the whole blot and to its parts. The prevalence of whole-interpretations of good quality is taken to indicate the prevalence of abstract theoretical thinking in the subject. The prevalence of responses to "normal details," i.e., to large segregated parts of the blot that naturally stand out, is interpreted as indicating thinking of a more practical type, one that is well adapted to the concrete situation. According to Rorschach, in the majority of normal subjects the whole-responses constitute about one fourth and the normal details about two thirds of the total responses, the rest being taken up by responses to unusual details.

In an attempt to correlate these Rorschach scores to the performance types found in our test, both tests were given to a group of ten undergraduate students (girls), a group that was not included in our main experimental group because of the difference in educational level.[4] These subjects were divided into two groups on the basis of their Type of Apperception in the Rorschach Test. One group consisted of seven girls whose responses referred to normal details in two thirds or more of the cases. Their thinking, consequently, would be considered as of a concrete practical type. In the remaining three subjects the normal details constituted less than one half of the total responses, the shift being largely in favor of the whole responses. Such distribution of responses would indicate the prevalence of abstract theoretical thinking. In classifying these ten subjects on the basis of their approach to the concept formation task, we found that in the first group two subjects displayed the conceptual and five the perceptual approach, whereas of the three girls whose Rorschach scores indicated theoretical thinking, two showed the conceptual and one the perceptual approach. This evidence is by no means sufficient, but it seems to indicate that the conceptual and perceptual approaches to tasks are not limited to our particular test situation but represent personal patterns of more general nature.

The Rorschach Test might possibly be used as a tool also for the validation of the concordance-discordance patterns. The comparison, however, would have to be made not with any one score, but with some aspect of the total personality picture arrived at through

[4] I am indebted to Miss Sally Blodgett for giving the tests to this group and for the scoring and interpretation of the results.

the interpretation of all scores considered in relation to each other. This is a task for future investigators.

Finally, we shall consider the relation between the patterns of performance in our test, and the subjects' sex and educational achievement. The relationship between sex and the conceptual or perceptual approach is shown in Table 3.

TABLE 3

	Men	Women		
Conceptual approach	19	9	$X^2 = 6.348$	$p = .014$
Perceptual approach	13	23		

We find a pronounced difference between the sexes: men are found more frequently in the conceptual, women in the perceptual group, and this relationship is a statistically significant one, as tested by the chi-square test. For the concordance-discordance patterns, on the other hand, the results of the comparison are essentially negative. Although more women than men show the concordant performance (21 women and 16 men), the difference is not so pronounced as to be statistically significant.

In order to test the relationship between the performance patterns and the educational achievement, we divided our group, which consisted of college graduates only, into those subjects who, at the time when they were tested, had a Ph.D. or an M.D. degree, and those who did not have degrees beyond the M.A. (There were five subjects in the latter group who had the M.A. degree.) The distribution of these two groups with regard to the conceptual-perceptual pattern of performance is shown in Table 4.

TABLE 4

	Degree	No Degree		
Conceptual approach	17	11	$X^2 = 11.45$	$p < .01$
Perceptual approach	7	29		

We find that subjects with degrees are prevalent in the conceptual, those without degrees in the perceptual group. Thus the possession of a degree is associated with the prevalence of conceptual approach, and this association is a highly significant one statistically. There is no relationship, on the other hand, between the possession of a degree and the concordant or discordant type of test performance. The possession of a degree, however, might not be the best indication of the actual level of achievement reached by a person in his work. Among our subjects there were eight or ten research workers of widely recognized achievement. They were found to belong almost *in toto* to the subgroup that combined conceptual approach with concordant relationship between conceptual

and perceptual processes. Thus the conceptual-concordant pattern of performance seems to be linked most closely with original productive research.

If one leaves aside this last observation pertaining to a relatively small group, the outstanding result is that the conceptual-perceptual patterns show a definite relationship to the subjects' sex and educational achievement, whereas the concordance-discordance patterns do not. This result confirms indirectly the independence of the two pairs of patterns from each other. Beyond this, what clues do our findings offer for the understanding of the nature of the patterns studied? The following discussion attempts to answer this question in a purely tentative way.

1. The prevalence of active thinking or of "perceptual" factors in approach to problems might be conceived of as an integral part of a person's original endowment. In the adult, at any rate, these patterns represent a personal constant, and are related to attitudes that one considers as typically masculine or feminine. The possession of the conceptual pattern predisposes the person to theoretical interests and pursuits, and is a necessary condition of achievement in the theoretical field.

These formulations may require some elucidation. In the first place, one should remember that by conceptual pattern we mean only a *relative* prevalence of thinking over the more immediate contact with the material. It is likely that no performance that requires dealing with concrete material could be successfully completed without a participation of the "perceptual" factor. The second misunderstanding may arise from a comparison of our findings with those of genetic psychology. It is generally agreed that in the development of the child the predominantly perceptual performance precedes the stage of abstract conceptual thinking. Such performance may be considered as characteristic of the primitive mentality in general (**4**). It would be incorrect, however, to apply this interpretation to our results, and to consider those of our subjects who used the perceptual approach to the task as being on a lower level of mental development than that of the "conceptual" group. To be on a lower level of development means to lack ability for abstract conceptual thinking; young children, for example, are unable to solve a task like ours in any insightful logical way. All of our subjects, on the other hand, displayed a clear understanding of the abstract task of classification and a fully developed ability for logical procedure. Their final solution of the problem was always insightful, and in this sense it may be called conceptual.

The terms *conceptual* and *perceptual* as used in the present study with superior adults, refer merely to the difference in ways and means which the subjects used to reach the solution.[5]

2. The nature of the concordance-discordance patterns is less clear than that of the conceptual-perceptual patterns. Different possibilities might be considered. It may not be a constant personal pattern at all, the individual differences being the result of certain secondary features of the test. The frustrating nature of the test, for example, might have led to a greater emotional tension, and, consequently, to a disruption of performance, in the more ambitious subjects, or in those who for some reason were momentarily more susceptible to frustration. This interpretation is probably true for a number of our cases. The other possibility is that the pattern is a more general one, and that the mildly "catastrophic" reaction to tension-situation is in itself a consequence of this pattern. In most general terms the pattern that manifests itself in discordant performance might be described as lack of harmony and integration between the different psychological functions. The resulting conflict of different tendencies would make itself strongly felt in any complex performance including the intellectual. It would bar the person from making full use of his potentialities and would represent a constant obstacle of achievement. In our study this was borne out by the low performance scores of the discordant group as well as by the absence from this group of the most productive workers.

Much further work has to be done before these tentative conclusions can be verified. The results of the present study seem to indicate, however, that an attempt to consider intellectual performances in relation to personality structure is a fruitful one and well worth continuing.

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[5] Adults of noncollege educational level were frequently found to lack adequate insight into the concept formation task (**2**, **3**). In their case the perceptual performance often resulted from inability to handle the task conceptually and was actually an indication of a more primitive level of intellectual development. Consequently, the test can be used for studying the personal patterns of performance only if the group studied is known to be homogeneous with regard to the general level of intellectual development which is roughly indicated by the educational level.

TELEONOMIC DESCRIPTION IN THE STUDY OF BEHAVIOR*

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THE PROBLEM

An approach to the study and measurement of personality has recently been suggested, involving the concept of "teleonomic description." To quote from an article cited below, we can study personality by observing a large sample of the behaviors of a single individual, and "as long as the generalization (or prediction) made from this sample does not transcend the field of data from which it was obtained, that is, so long as it is made to apply to this one individual's behavior and to no other, such a generalization involves no violation of sound scientific procedure. And the attempt, in this way, to discover laws of individuals is precisely what we mean by the scientific study of personality. Instead of thinking in terms of degrees of abstracted qualities of behavior," this article continues, "let us take the behavior itself in its full significance for making some adjustment or bringing about some change in the individual's environment. Instead of asking whether an instance of behavior may be characterized as ascendant, let us ask what the behavior itself is, what it means, and in what degree its intention or meaning is being carried out. In short, what does the individual seem to be 'trying to do' in being ascendant? We are interested, in other words, not in traits, but in *behavior trends.* We can describe the individual's trend of behavior *teleonomically,* that is, in terms of the purpose or purposes which he seems to be trying to carry out."[1] It is the purpose of the present article to

*This article is condensed from a thesis submitted by Ray S. Musgrave in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology at Syracuse University, Aug., 1937.

[1] Allport, F. H. Teleonomic description in the study of personality, *Character & Pers.*, 1937, **5**, 203 f. For an experimental application of this method, see Floyd H. Allport and Norman Frederiksen, Personality as a pattern of teleonomic trends, *J. soc. psychol.*, 1941, **13**, 141-182.

apply this method not to the study of specialized personality trends, but to the more basic problem of describing behavior in general.

An investigator employing teleonomic description directs his attention to the behavior stream itself and seeks to describe each act at the time of its occurrence. When we observe behavior, we see certain explicitly denotable organs moving, e.g., hands, fingers, arms, head, etc. These movements are patterned or integrated so as to produce some change in the individual's condition or in his environment. The constituent elements of an act are: (1) explicitly denotable organs, (2) moving in an integrated pattern (provision-integration), and (3) resulting in some change in the acting individual's condition or in his environment (provision result).

The observer must be set continually to answer the question, "What is that individual trying to do?" He can say that he has observed an act when he has seen a series of integrated movements of explicitly denotable organs which results in some change in that individual's condition or in his environment. The description which he gives of that act is then stated in terms of what he (the observer) would be trying to do if he were making the same movements (in the same situation and with the same materials). This does not mean that the observer makes a subjective effort to read the subject's conscious purpose, nor does it imply purpose as an agent, motive, or force behind his activities. Purpose is here used purely as a means of description.

In reading through a record of many individually described acts, one notices that groups of them seem to fit together logically into a series. Such series can usually be described in terms of the provision-result achieved by the combination of the constituent acts. For example, suppose the record included this sequence:

Woman picks up dish from floor
Woman picks up milk bottle
Woman pours milk into dish from bottle
Woman sets dish on floor
Woman speaks to dog: all right, you may have your breakfast now

This entire series of acts can be grouped logically under a single heading which might be called "feeding the dog." This one phrase is descriptive of the end result, but does not tell *how* the dog is fed. Such a series is called a *telic series,* and the phrase describing it is called the *series description.*

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THE PROBLEM

An approach to the study and measurement of personality has recently been suggested, involving the concept of "teleonomic description." To quote from an article cited below, we can study personality by observing a large sample of the behaviors of a single individual, and "as long as the generalization (or prediction) made from this sample does not transcend the field of data from which it was obtained, that is, so long as it is made to apply to this one individual's behavior and to no other, such a generalization involves no violation of sound scientific procedure. And the attempt, in this way, to discover laws of individuals is precisely what we mean by the scientific study of personality. Instead of thinking in terms of degrees of abstracted qualities of behavior," this article continues, "let us take the behavior itself in its full significance for making some adjustment or bringing about some change in the individual's environment. Instead of asking whether an instance of behavior may be characterized as ascendant, let us ask what the behavior itself is, what it means, and in what degree its intention or meaning is being carried out. In short, what does the individual seem to be 'trying to do' in being ascendant? We are interested, in other words, not in traits, but in *behavior trends.* We can describe the individual's trend of behavior *teleonomically,* that is, in terms of the purpose or purposes which he seems to be trying to carry out."[1] It is the purpose of the present article to

* This article is condensed from a thesis submitted by Ray S. Musgrave in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology at Syracuse University, Aug., 1937.

[1] Allport, F. H. Teleonomic description in the study of personality, *Character & Pers.*, 1937, **5**, 203 f. For an experimental application of this method, see Floyd H. Allport and Norman Frederiksen, Personality as a pattern of teleonomic trends, *J. soc. psychol.*, 1941, **13**, 141-182.

apply this method not to the study of specialized personality trends, but to the more basic problem of describing behavior in general.

An investigator employing teleonomic description directs his attention to the behavior stream itself and seeks to describe each act at the time of its occurrence. When we observe behavior, we see certain explicitly denotable organs moving, e.g., hands, fingers, arms, head, etc. These movements are patterned or integrated so as to produce some change in the individual's condition or in his environment. The constituent elements of an act are: (1) explicitly denotable organs, (2) moving in an integrated pattern (provision-integration), and (3) resulting in some change in the acting individual's condition or in his environment (provision result).

The observer must be set continually to answer the question, "What is that individual trying to do?" He can say that he has observed an act when he has seen a series of integrated movements of explicitly denotable organs which results in some change in that individual's condition or in his environment. The description which he gives of that act is then stated in terms of what he (the observer) would be trying to do if he were making the same movements (in the same situation and with the same materials). This does not mean that the observer makes a subjective effort to read the subject's conscious purpose, nor does it imply purpose as an agent, motive, or force behind his activities. Purpose is here used purely as a means of description.

In reading through a record of many individually described acts, one notices that groups of them seem to fit together logically into a series. Such series can usually be described in terms of the provision-result achieved by the combination of the constituent acts. For example, suppose the record included this sequence:

Woman picks up dish from floor
Woman picks up milk bottle
Woman pours milk into dish from bottle
Woman sets dish on floor
Woman speaks to dog: all right, you may have your breakfast now

This entire series of acts can be grouped logically under a single heading which might be called "feeding the dog." This one phrase is descriptive of the end result, but does not tell *how* the dog is fed. Such a series is called a *telic series,* and the phrase describing it is called the *series description.*

Certain fundamental problems become apparent when an investigator seeks to use this method of teleonomic description. To what extent do different observers agree in their descriptions of the same behavior? What change in observer agreement follows training and practice? Do some observers give more complete descriptions than others? Can the completeness of a given observer's record be determined and his "error of observation" be measured?

The present report deals with the first three of the above questions. Subsequent articles will deal with the measurement of "error of observation" and the application of this method to a study of the characteristics of behavior.

Procedure

Materials. The motion picture technique was employed because of its relatively complete control of subject matter and conditions of observation. Activities of the subject being studied could be shown to one observer at a time, and the descriptions given by many observers could be treated as though they had all been given simultaneously.

The experimental film. This film, taken by the investigator, showed a young woman doing a number of ordinary things in a home situation. The various scenes showed the subject taking off her coat and putting it away; typewriting a letter and preparing it for mailing; taking clippings from a magazine and pasting them in a scrapbook; preparing and eating a lunch; reading a newspaper and petting a dog. The film, 200 feet in length, required approximately 8.5 minutes for projection.

Practice films. Three other short films, showing a variety of behaviors, were used in the practice sessions. None of the activities shown in these films duplicated those shown in the experimental film. These were used in training observers in the "practice" group.

Observers. Observers were divided into two groups of 25 each.

Group A, the "nonpractice" group, consisted of 12 women and 13 men, all college undergraduate students. All were psychology majors and had had some experience with psychological experimentation prior to this study.

Group B, the "practice" group, consisted of 13 women who were all advanced student nurses, and 12 men who were college undergraduate students. None were psychology majors and none had participated in psychological research prior to this study.

"Test" Observation

Observers were taken one at a time, and given the following instructions:

> You will be shown a film showing an individual doing a number of things. You are asked to observe very carefully and tell what that individual is doing at each moment.
>
> In other words, state each act of the individual's behavior as it is taking place.

The experimental film was projected as soon as it was certain that these instructions were understood. An expert stenographer recorded in shorthand every statement of any kind made by the observer.

"Retest" Observation

Exactly one week after this first or "test" run of the film, each observer was again given the same instructions and shown the experimental film a second time. During the interval between "test" and "retest," observers in Group A received neither instruction nor practice in describing behavior. Group B, or the "practice" group, was given some training and limited practice in teleonomically describing behavior.

Training Program for "Practice" Group

A brief mimeographed exposition of the method of teleonomic description was given to each observer in Group B immediately after his "test" observation. He was asked to study it carefully before his next meeting with the experimenter.

Observers met in groups of three for the practice periods. At the next meeting of observers and experimenter, observers were provided with pencil and paper and asked to write down just what they saw happen as the experimenter performed a series of demonstrations.[2]

(1) The experimenter stepped through a doorway out of sight of the observers. He projected a small box part way beyond the door casing and into the field of vision of the observers. This box was lowered a distance of approximately one foot, and then withdrawn from the field of vision of the observers. While this was done, no part of the experimenter was visible to the observers.

(2) The experimenter, still standing so as not to be visible to the observers, extended his right arm with his hand clenched until his fist could

[2] The procedure employed in the training of Group B, as well as the principle of division of acts into organ movements, provision integration, and provision result, and the telic series concept, have been adapted from a methodology of behavior act-analysis devised by Floyd H. Allport. A more complete account of this "teleonomic" method will be given in a later publication by that author.

be seen by the observers. The hand was unclenched, that is, the fingers were extended, and again the hand was clenched. The hand and forearm were then withdrawn from view of the observers.

(3) The experimenter, standing in full view of the observers, went through the motions of writing in the air, attempting to make all the movements that would spell the word CAT. However, in doing this he mixed the various parts of the component letters so as not to have any two usually adjacent movements together.

(4) The experimenter wrote the word CAT "in the air."

Following these demonstrations, the experimenter discussed with the observers the descriptions they had given. It was agreed that the first two demonstrations illustrated the *necessity of seeing (or at least speaking in terms of) the whole individual while he is acting, if his behavior is to be accurately described.* For example, practically all observers had said "box is held, box is moved down, box is withdrawn," thus describing only the *provision-result,* and employing the passive voice. Behavior was implied, but could not be described (even though its result was apparent) because the acting individual could not be seen.

Similarly, in describing the second demonstration, observers said either "man extended his hand, stretched out his fingers, and then withdrew his hand" or "the fist was extended, etc." In this case, while part of the acting individual was in sight, it was necessary to describe movements of only a part of the individual—making it description at the organic level, or, since the hand was a part of a man, it was necessary to infer what the whole person did from the observation of only a limited part of the body. The provision-integration was incomplete, and the behavior was not sufficiently meaningful to be described as acts of an individual. If behavior is to be described, observers agreed, it must involve all three elements of acts.

Descriptions of the third demonstration stated or implied "man is making movements *as if* writing in the air," or "man is making writing movements, but I can't tell what he's writing," thus emphasizing the fact that *the movements must have a clear-cut meaning (provision-integration) for the observer if he is adequately to describe them as acts.*

Discussion of the final demonstration brought out *the ease with which a clear-cut activity can be described when its meaning, or purpose, is obvious to the observer.* Stated differently, when the behavior of a subject is such that he is "trying to do something," an observer can accurately describe his behavior teleonomically, i.e., the observer can describe what the subject is "trying to do."

After the essential points in teleonomic description were thus developed through these demonstrations and discussions, the experimenter asked the observers to employ them in describing a series of acts. He then walked across the room to a blackboard, picked up a piece of chalk, wrote the word CAT on the blackboard, laid the chalk down in the chalk tray, turned around again facing the group, and walked back across the room to his original position, smiling as he walked. Descriptions of these simple acts usually agreed quite highly with one another, and they were briefly discussed to bring out the fact that some descriptive phrases may be more accurate than others.

The first practice film was run immediately following the demonstrations and discussion. The experimenter described the first few acts aloud, illustrating the form of description. Then the observers, one at a time, described aloud the successive acts shown in the remainder of the film. The projector was stopped frequently, and the descriptions were discussed and criticized. This general procedure was followed until signs of fatigue or loss of interest on the part of the observers was apparent.

At a final practice session the time was entirely devoted to running the second and third practice films. As in describing the behaviors shown in the first practice film, observers, one at a time, described the activity shown in successive sections of each of these films. While one observer stated descriptions, the other members of the group listened, at the same time watching the screen. The projector was stopped after six or eight acts had been described, and the descriptions of those acts were criticized and discussed by the other observers. These descriptions were also related, wherever possible, to the demonstrations and mimeographed exposition of the teleonomic method.

No effort was made to make the various practice periods of a standard length, but the time spent was determined largely by the interest and convenience of the observers. While no actual record was kept, it is estimated that about an hour and a half was required for the demonstrations and discussion, and that each observer spent only about fifteen minutes in actually describing behavior. In reality, the "practice" group of observers had comparatively little practice. A considerable amount of the theory of the teleonomic method was presented, however.

Tabulation of Data

Every word spoken by an observer in his test and retest observations was recorded in shorthand by an expert stenographer. Since each one had been instructed to "state each act of the individual's behavior," the descriptions were in the form of a series of separate statements. Each of these statements was placed on a line by itself when the stenographic record was transcribed. The first scene in the film served as a "warm-up period," and the descriptions given for it were not tabulated.

What each observer said (or failed to say!) in describing each act was determined as the first step in computing observer agreement. One act was considered at a time in making the tabulations. The experimenter's description was written at the top of a sheet of paper, and what each observer had said relative to that act was recorded on a separate line. Failure to mention that act was tabulated as a short line following the observer's initials. Thus, after this procedure had been followed for all observers there was available for further study, on a single sheet of paper, every statement that had been made about that act.

The modal description, i.e., that statement given by the largest number of observers, was then determined by inspection of the summary sheet. This modal description was recorded at the top of a mimeographed tabulation sheet which had spaces for tallying (1) the number of times this description was given (agreement or "this"), (2) the number of times the descriptions were stated in terms different from the modal one (disagreement or "else"), and (3) the number of times no description was given ("none").[3] All three of these were determined for (1) mention or implication of explicitly denotable organs, (2) characterization of the provision-integration, i.e., the verb, and (3) provision-result.

In tabulating the provision-integration the tense of the verb was disregarded, i.e., "takes," "is taking," "took" were all tabulated as "takes." Different tenses were considered as equivalent on the hypothesis that different observers conceived the task of description differently. Some of the observers seemed to think of the behavior as though it were being performed at the time of observation; and so used the present tense. Others interpreted the situation as calling for description of what the subject was doing when the pictures were taken, and so used the past tense.

As an illustration of the procedure for tabulating agreement (and disagreement) with the modal description of an act, suppose that the modal description, "puts paper in the envelope," had been given by Observer A; a tally is entered in the "this" column under "explicitly denotable organs," and also in the "this" column under "provision-integration" and "provision-result." This descriptive phrase clearly indicates what explicitly denotable organs were moving, the way in which the movements were integrated, and the result achieved. Individual B had said "places paper in the envelope"; the "this" column under "explicitly denotable organs" is checked since it is apparent that the same explicitly denotable organs would be used, whether one were placing a paper or putting it in an envelope. The "else" column under "provision-integration" is checked since the verb "places" is different from "puts" (the modal verb). In tabulating provision-integration agreement the actual verbs themselves are used, and not similarity in meaning. Finally, a tally is placed in the "this" column under "provision-result," since the thing done or accomplished is clearly the same thing when the paper is placed in an envelope and when it is put in an envelope. Individual C had not mentioned this act; a tally is placed in the "nothing" column under all classifications.

Data for each act for all observers in Groups A and B in both the test and retest showings of the experimental film were tabulated in this manner.

Observer Agreement

Observer agreement was computed by determining the per cent of the group of observers under consideration who incorporated in

[3] See Appendix, pp. 341-343.

their descriptions the same reference to a selected phase of a specific act. In terms of our act analysis, it is possible to speak of observer agreement with reference to explicitly denotable organs, or with reference to provision-result, or of agreement in using the same word or words to characterize the provision-integration.

Provision-integration agreements are reported in this study, since they are characterized by the verb. Frequently the verb tells or implies the nature of all three aspects of the act, and here the distinction between provision-result and provision-integration is merely a logical one. "Typewrites" illustrates this point. This single word indicates the explicitly denotable organs involved, how their movements are integrated, and the result.

1. *Agreement among untrained and unpracticed observers.* All observers in both groups were considered untrained and unpracticed observers at the test showing of the experimental film. Table 1 shows the average agreement for the acts in the various scenes, and also for all acts. These agreements were computed by an all or none procedure; either the verb used by a given observer was the "modal" one and in agreement, or it was something else and not in agreement. If the act was not mentioned, it was considered also as not in agreement.[4]

For many acts, however, any one of two or three verbs seemed equally applicable and therefore in agreement. For example, the modal description for one act was "puts pencil down." Other descriptions were "lays pencil down," "places pencil down," and "sets pencil down." All of these refer to certain movements which "get the pencil on the table." It would seem that "puts," "places," and "lays" are all applicable and satisfactory because a pencil just isn't the right size to be "set down."

Four individuals were asked to make independent judgments concerning the appropriateness of each of the different terms used to describe each act in the experimental film. These judges were familiar with the film and the method, but were not members of either Group A or B. One act was considered at a time. Every phrase that had been used to describe that act was read. Each judge indicated on the form provided whether or not that phrase would be acceptable to him as a description of what he would be doing if he were making the same movements with the same materials. Terms agreed upon by a minimum of three of the four judges as being acceptable characterizations of that provision-inte-

[4] See Appendix.

gration were designated provision-integration equivalents (p-i equivalents).

The problem here has been to determine which verbs are appropriate for use in characterizing certain acts, *not* which verbs are synonymous. It is quite probable that some of these verbs might be judged not equally applicable to other acts in other situations.

Observer agreement was again computed, this time on the basis of p-i equivalents. In general, this resulted in an increase of average observer agreement over the percentages shown in Table 1 of about 10 per cent for Group A and 8 per cent for Group B.

TABLE 1

AVERAGE OBSERVER AGREEMENT IN PER CENT AMONG UNTRAINED OBSERVERS, BASED ON PROVISION-INTEGRATION TABULATIONS ON TEST RUN OF FILM

Scene	*Average agreement for* Group A	Group B
B Writing a letter	44.63	38.06
C Making a scrapbook	42.28	36.17
E Preparing and eating a lunch	41.84	36.10
F Reading and petting dog	39.00	40.00
Average agreement on all acts described	41.93	37.58

Each act described by two or more observers, together with the extent to which observers agreed in their descriptions of that act, are shown in the Appendix.[5] The percentages here reported are based on p-i equivalents, and the extent to which each group agreed appears in the columns headed "% Group A Test" and "% Group B Test."

The second and third columns of the Appendix identify the act as to scene and place in the sequence of this scene. The modal description appears in column four. In describing Act 1 ("Typewrites") of this series, 100 per cent of the observers in each group gave the modal description. This may be contrasted with Act 2 ("pushes carriage over"), for which 92 per cent of Group A and 60 per cent of Group B gave the modal description, and 8 per cent of Group A and 40 per cent of Group B were in disagreement. In the table, "this" refers to the modal descriptive formulation (or its p-i equivalent); "else" is used to indicate a description worded differently; and "none," an omission of any mention of the act.

2. *Observer agreement following training and practice.* When the effect of practice was considered, certain changes in observer agreement were apparent. These were brought out through compari-

[5] Data reported in the Appendix include parts of two of the four complete scenes. Complete data from all four scenes may be obtained in mimeographed form from the author.

son of descriptions given at the "test" and "retest" showings of the experimental film.

Since merely describing behavior once affords an observer some practice, these two groups could not be strictly considered a practice group versus an unpracticed one. Rather, they were compared as two practiced groups, differing in the *amount* and *kind* of practice. Group A received no instruction in the method of teleonomic description. Perhaps the most important distinction between the two groups in practice lies in the fact that Group B benefited by an analysis and criticism of the descriptions given in regular practice sessions, and so had some knowledge of improvement in accuracy and completeness of the descriptive statements made.

Observer agreement for each act on the retest showing of the film may be noted in the Appendix. In general, an increase in observer agreement was obtained in the retest. In other words, even the limited amount of practice of a previous description raised the per cent of agreement among observers in Group A; Group B, while agreeing to a lesser extent than Group A before the training sessions, raised its agreement in the retest enough to equal approximately that of the other group.

This approximate equality of the two groups after practice may be noted in two different ways. First, the difference in average agreement, when all acts described by two or more observers are considered, may be used as a basis for comparison. Table 2 summarizes the pertinent data on this point. While the increases are not statistically reliable, they suggest that in this particular study both groups improved. Considered in terms of number of observers, while Group A increased 5.72 per cent or about 1.5 observers, Group B increased 12.44 per cent or about three observers. Since 25 observers made up each group, an increase in agreement of 4 per cent represents one observer.

TABLE 2

AVERAGE OBSERVER AGREEMENT IN PER CENT FOR EACH GROUP ON TEST AND RETEST SHOWINGS OF EXPERIMENTAL FILM, AND DIFFERENCES FOR EACH GROUP BETWEEN TEST AND RETEST (BASED ON PROVISION-INTEGRATION EQUIVALENTS)

Acts Described by Group	*Average Agreement on*				
	Test	*Retest*	*Increase*	PE_{diff}	*CR*
A.....	52.07	57.79	5.72	9.75	.586
B.....	45.75	58.19	12.44	9.75	1.275

A second kind of comparison may be made on the basis of the data presented in Table 3 which shows the frequency of various

amounts of increase in observer agreement. Briefly, Table 3 shows that Group B increased in agreement on 117 different acts, and the per cent of increase ranged from 4 per cent to 76 per cent with an average increase of 28.49 per cent. On the other hand, Group A increased in agreement on 95 different acts, with the amount of increase ranging from 4 per cent to 48 per cent and the average increase being 15.49 per cent.

TABLE 3

FREQUENCY OF VARIOUS AMOUNTS OF INCREASE IN OBSERVER AGREEMENT ON ALL ACTS ON WHICH ANY INCREASE WAS SHOWN (BASED ON PROVISION-INTEGRATION EQUIVALENTS)

Increase in Per Cent	*Number of Acts on Which Each Increase Was Shown by* Group A	Group B
76	0	1
72	0	1
68	0	4
64	0	2
60	0	4
56	0	3
52	0	8
48	1	3
44	2	6
40	1	6
36	4	5
32	3	4
28	5	8
24	5	6
20	7	9
16	11	14
12	20	8
8	21	10
4	15	15
Total Number of Acts Showing Increase	95	117
Average Per Cent of Increase	15.37	28.49
Probable Error of Increase	4.80	6.00

OBSERVER ACHIEVEMENT

When observer agreement is computed as a percentage of the entire group of observers who agree in descriptive terms employed, the assumption must be made that all observers are equally "good." Consideration of observer achievement scores, or the number of acts described in some manner by a given observer, shows clearly that some observers describe more acts than do others when they are all observing the same behavior. Data on this point are presented in graphic form in Figure 1.

Note that the distributions for both groups on the test showing approximate the normal curve. Note also that the distribution of retest scores for Group A approximates a normal distribution, while

FIGURE 1

DISTRIBUTIONS OF OBSERVER ACHIEVEMENT SCORES

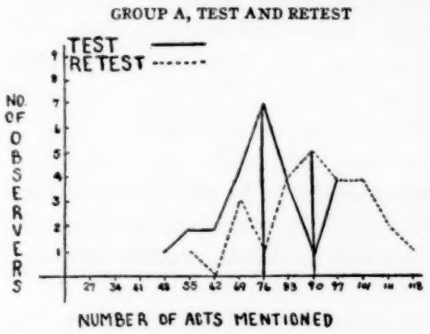

FIGURE 1A

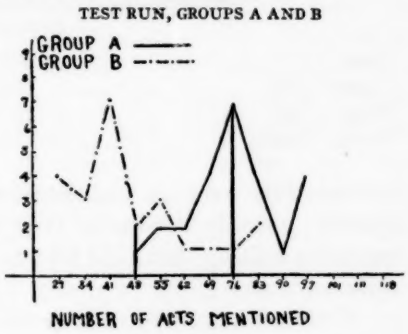

FIGURE 1C

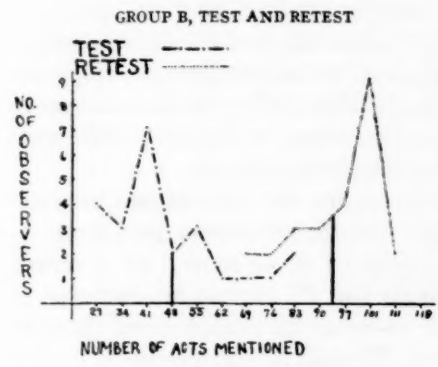

FIGURE 1B

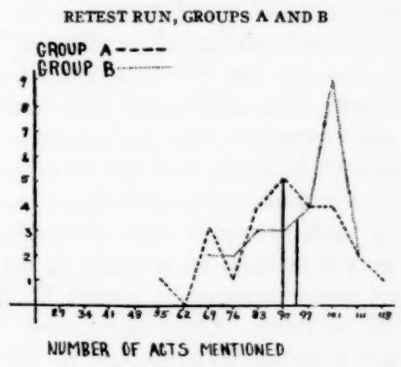

FIGURE 1D

the retest scores for the "practice" group tend toward a skewed and double-J-shaped distribution.

If all observers were "perfect" observers, that is, if all observers described every act, the distribution would be I-shaped and all observers would fall at the mode. This shift from an approximately normal distribution before training to a J-shaped one (with a smaller sigma) after training, might be considered indicative of a tendency to approach more nearly this I-shaped distribution. With one exception, those differences in observer achievement are statistically significant, as is shown in Table 4.

Even more striking than the shift toward the I-shaped distribution is the increase in size of observer achievement scores. The difference in mean observer achievement score for Group A was 15.60 acts; i.e., the practice afforded by once describing the film

TABLE 4

DIFFERENCES, STANDARD ERRORS OF THE DIFFERENCES, AND CRITICAL RATIOS OF DIFFERENCES IN OBSERVER ACHIEVEMENT SCORES

	Difference	*SE diff.*	*CR*
A_{test}-B_{retest}	26.06	4.74	6.10
A_{retest}-A_{test}	15.60	4.09	3.56
B_{retest}-B_{test}	45.79	4.62	9.91
B_{retest}-A_{retest}	3.23	3.47	.93

increased the average number of acts mentioned by this group to that extent. Group B almost tripled this difference, the average act score increasing from 51.64 on the test to 97.43 on the retest, a difference of 45.79.

On the basis of this comparison it may be said that the observers in Group A—the psychology majors—were "better" observers on the test, but that Group B—the observers in the "practice" group—, not nearly so "good" on the test, slightly surpassed the "nonpractice" group on the retest, and thus showed relatively greater improvement in the number of acts described. The difference between mean act scores for the two groups on the retest is the only difference shown in Table 4 which is not statistically significant.

Consideration of increase in act scores for individual observers in each group is also interesting. Of the observers in Group A, only 4 showed an increase in act scores of 30 or more. In contrast, of the observers in Group B, 20 of the 25 earned an increase of 30 or more. Only one Group A observer increased more than 40 act descriptions from test to retest; 18 observers in Group B earned increases of 40 or more.

In order to determine the completeness of the descriptions of the entire experimental film given by a single observer, an "expert" description was prepared. Since the film had been shown to approximately 125 other individuals in preliminary studies, and the present study involved 100 showings, the experimenter had seen it approximately 225 times. On the basis of these many observations, supplemented by a frame-by-frame analysis, he was able to formulate an expert description which included every single act performed in the entire sequence. Column I of the Appendix shows the "expert" descriptive formulation.

It will be recalled that in order to compute observer agreement it was necessary that two or more observers in a group describe a given act. A total of 150 acts in the four scenes tabulated was described by two or more observers. The "expert" description included 193 acts, or 43 more than were described by any two or

more observers. At first thought it would seem that these observers were very inefficient, especially when one recalls that even the best observer described only 119 of the 193 acts. Analysis of the acts which were included in the "expert" description and omitted from the others, however, reveals that the omissions were, in most cases, acts which were necessarily integral parts of sequences of acts, i.e., they were definitely parts of telic series and preceded other acts, the descriptions for which might legitimately also serve as telic series descriptions. For example, in Scene B, "strikes space bar" might well be considered a part of a series described by "typewrites," and "typewrites" may be properly given as the series description. Again, "picks up paper" was omitted by all observers, and "turns paper over" (Scene B, Act 19) could be considered as descriptive of a telic series which included "picks paper up." Likewise, the omitted acts "lays paper on the table" and "creases paper" are parts of the telic series "folds the paper" (Scene B, Act 21). That this apparent tendency in some instances to give series descriptions rather than act descriptions only is related to observer agreement is shown by the fact that observer agreement was high on those acts which could also serve as series descriptions and which followed omitted ones in the modal description list shown in the Appendix.

Conclusions

The data presented in the preceding sections bring out two facts. (1) Observer agreement, when computed as a percentage of the total number of observers who describe in the same manner a given act, while raised to some extent following a limited amount of practice, still is relatively low—averaging around 58 per cent. (2) No observers describe all acts, and some observers describe many more acts than do other observers. There are marked *differences between observers in the number of acts they describe* when all are observing the same behavior. When these facts are considered together it is apparent that *observer agreement is not an adequate criterion of observer reliability, unless only the "best" observers are used,* i.e., unless only observers with maximum behavior observational ability are used.

It is quite probable that when we use only the best observers there will still be acts which are not described. However, if further research bears out the present findings with regard to the use of telic series descriptions for acts which follow these omitted ones, the records still will be complete enough for all practical requirements. It still provides the investigator with observations which

more nearly approximate a record of every act of the subject than is possible to obtain with the descriptive category and trait approaches commonly employed.

The writers believe that the chief values of the work here reported are to be found in the methods of (1) training observers, (2) selecting the best or the most promising observers, and (3) obtaining measures of the actual efficiency of various observers in behavior description, i.e., determining what degree of completeness of record we may expect from observers who have had specified amounts of practice and training. Methods for obtaining more adequate recording of descriptions through the use of a dictaphone, and for a more objective means of determining provision-integration equivalents are now being developed.

APPENDIX*

PER CENT OF OBSERVERS, ON TEST AND RETEST, GIVING FOR EACH ACT: MODAL DESCRIPTION OR ITS PROVISION-INTEGRATION EQUIVALENTS ("THIS"); DESCRIPTIONS OTHER THAN THE MODAL ONE OR ITS PROVISION-INTEGRATION EQUIVALENTS ("ELSE"); AND NO DESCRIPTION ("NONE")

"Expert" Description	Scene	Act No.	Observers' Modal Description	Said	% Group A Test	% Group A Retest	% Group B Test	% Group B Retest
Typewrites	B	1	Typewrites	This	100	100	100	100
				None	0	0	0	0
Pushes carriage over	B	2	Pushes carriage over	This	92	96	60	96
				Else	4	4	8	0
				None	4	0	32	4
Strikes space bar				None	100	100	100	100
Typewrites	B	3	Typewrites	This	72	96	44	88
				Else	4	0	0	4
				None	24	4	56	8
Adjusts paper by turning roller	B	4	Adjusts roller	This	0	8	8	12
				Else	0	0	0	4
				None	100	92	92	84
Pushes carriage over	B	5	Pushes carriage over	This	76	76	32	84
				Else	4	0	8	0
				None	20	24	60	16
Typewrites	B	6	Typewrites	This	40	88	28	96
				Else	12	0	0	0
				None	48	12	72	4
Pushes carriage over	B	7	Pushes carriage over	This	44	72	16	68
				Else	0	0	4	0
				None	56	28	80	32
Typewrites	B	8	Typewrites	This	24	64	12	64
				Else	0	0	0	0
				None	76	36	88	36
Takes paper out of typewriter	B	9	Takes paper out of typewriter	This	96	92	72	88
				Else	0	4	8	8
				None	4	4	20	4
Turns paper over	B	10	Turns paper over	This	76	92	96	96
				Else	4	0	4	0
				None	20	8	0	4
Puts paper back in typewriter	B	11	Puts paper back in typewriter	This	84	88	48	84
				Else	0	0	0	0
				None	16	12	52	16
Adjusts paper in roller	B	12	Adjusts paper in roller	This	40	48	24	32
				Else	0	4	0	4
				None	60	48	76	64
Typewrites	B	13	Typewrites	This	88	88	68	96
				Else	4	8	4	0
				None	8	4	28	4
Rolls paper out of typewriter	B	14	Takes the paper out	This	100	96	88	96
				Else	0	4	4	4
				None	0	0	8	0
Lays paper on the table, *and at the same time*	B	15	Puts the paper down	This	16	8	8	20
				Else	0	0	0	0
				None	84	92	92	80
Picks up a pencil	B	16	Takes a pencil	This	28	64	4	60
				Else	0	0	0	0
				None	72	36	96	40
Writes on the paper	B	17	Writes on the paper	This	56	56	52	80
				Else	44	44	44	16
				None	0	0	4	4
Lays pencil down	B	18	Puts pencil down	This	24	24	4	28
				Else	0	4	0	4
				None	76	72	96	68
Picks paper up *and*				None	100	100	100	100
Turns paper over	B	19	Turns paper over	This	56	44	32	52
				Else	8	0	0	4
				None	36	56	68	44

*See pp. 333 ff. for explanation and comment. Data here reported include parts of two of the four complete scenes.

APPENDIX *(Continued)*

"Expert" Description	Scene	Act No.	Observers' Modal Description	Said	% Group A Test	% Group A Retest	% Group B Test	% Group B Retest
Looks at paper	B	20	Looks at the paper	This	0	4	8	4
				Else	0	0	0	0
				None	100	96	92	96
Lays paper on the table				None	100	100	100	100
Folds paper in half	B	21	Folds the paper	This	100	96	92	96
				Else	0	0	8	4
				None	0	4	0	0
Creases paper	B	22	Creases it	This	0	12	0	16
				Else	0	0	0	0
				None	100	88	100	84
Turns paper around				None	100	100	100	100
Folds paper in thirds	B	23	Folds it again	This	84	92	20	60
				Else	0	0	4	0
				None	16	8	76	40
Creases paper				None	100	100	100	100
Folds paper again	B	24	Folds it again	This	32	28	28	56
				Else	0	0	0	0
				None	68	72	72	44
Creases paper				None	100	100	100	100
Picks up an envelope	B	25	Takes an envelope	This	32	64	4	64
				Else	8	8	0	0
				None	60	28	96	36
Opens the envelope				None	100	100	100	100
Slips paper in envelope	B	26	Puts paper in envelope	This	96	100	100	92
				Else	0	0	0	0
				None	4	0	0	8
Licks flap of envelope	B	27	Licks flap of envelope	This	48	56	24	48
				Else	4	8	0	8
				None	48	36	76	44
Looks up				None	100	100	100	100
Seals envelope; laying it down on the table	B	28	Seals the envelope	This	92	76	96	72
				Else	8	8	0	8
				None	0	16	4	20
Turns envelope over				None	100	100	100	100
	B	29	Looks up	This	12	24	4	4
				Else	0	0	0	0
				None	88	76	96	96
Picks up the pencil	B	30	Picks up a pencil	This	8	36	0	40
				Else	0	0	0	0
				None	92	64	100	60
Picks up a can	E	1	Takes a can	This	40	40	16	80
				Else	24	16	4	0
				None	36	44	80	20
Shakes it	E	2	Shakes the can	This	56	68	48	76
				Else	0	0	0	0
				None	44	32	52	24
Transfers can to other hand				None	100	100	100	100
Puts can down on table				None	100	100	100	100
Picks up can opener	E	3	Picks up the can opener	This	12	48	0	64
				Else	0	0	0	0
				None	88	52	100	36
Punches a hole in top of can Turns can around and punches another hole Lays can opener down on table	E	4	Opens can with can opener	This Else None	72 24 4	88 12 0	80 12 8	76 16 8
Picks up can *and* glass	E	5	Picks up a glass	This	8	20	0	40
				Else	0	0	0	0
				None	92	80	100	60
Pours contents of the can into the glass	E	6	Pours contents into the glass	This	96	100	92	100
				Else	0	0	0	0
				None	4	0	8	0
	E	7	Puts can opener down	This	0	16	0	4
				Else	0	0	0	0
				None	100	84	100	96

APPENDIX *(Continued)*

"Expert" Description	Scene	Act No.	Observers' Modal Description	Said	% Group A Test	% Group A Retest	% Group B Test	% Group B Retest
Puts can down	E	8	Puts can down	This	24	52	12	64
				Else	4	4	0	4
				None	72	44	88	32
Puts glass down	E	9	Puts glass down	This	44	60	36	72
				Else	0	4	0	4
				None	56	36	64	24
Reaches for and picks up loaf of bread	E	10	Takes loaf of bread	This	68	92	44	84
				Else	4	4	12	12
				None	28	4	44	4
Opens wrapping on bread	E	11	Opens wrapper on bread	This	76	76	68	68
				Else	4	4	0	4
				None	20	20	32	28
Takes out two slices of bread	E	12	Takes out two slices	This	100	100	84	92
				Else	0	0	12	4
				None	0	0	4	4
Closes wrapping	E	13	Folds wrapper back up	This	48	60	28	72
				Else	0	0	4	0
				None	52	40	68	28
Puts loaf back	E	14	Puts loaf back	This	36	36	8	28
				Else	0	0	0	4
				None	64	64	92	68
Lays slices on table	E	15	Puts bread on table	This	8	20	4	24
				Else	0	0	0	0
				None	92	80	96	76
Pulls plate nearer her on table. Picks up both slices				None	100	100	100	100
Lays one slice on plate and other on table	E	16	Puts bread on plate	This	60	68	52	36
				Else	4	4	0	12
				None	36	28	48	52
Picks up a knife	E	17	Takes a knife	This	44	64	20	88
				Else	0	0	4	0
				None	56	36	76	12
Looks up	E	18	Looks up	This	12	16	12	8
				Else	0	0	0	0
				None	88	84	88	92
Takes butter on knife	E	19	Takes butter on knife	This	28	12	0	20
				Else	8	28	0	16
				None	64	60	100	64
Spreads butter on bread, Gets more butter on knife Spreads it on the bread, Gets more butter on knife Spreads it on the bread, Gets more butter on knife, Spreads it on the bread, (finally completely covering the whole surface of the slice)	E	20	Butters the bread	This	96	96	96	100
				Else	0	0	0	0
				None	4	4	4	0
Picks up jar of cheese spread	E	21	Takes jar of cheese	This	56	72	32	80
				Else	44	16	60	20
				None	0	12	8	0
Sets it down on table near her				None	100	100	100	100
Picks up the can opener	E	22	Takes the can opener	This	12	24	0	52
				Else	0	0	0	0
				None	88	76	100	48

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